# Proceedings of the California Academy of Natural Sciences

California Academy of Natural Sciences

2 Soc 4687.6

HARVARD
COLLEGE
LIBRARY

# PROCEEDINGS

12
4

OF THE

# CALIFORNIA ACADEMY

OF

# NATURAL SCIENCES.

VOLUME III.

1863-1867.

SAN FRANCISCO:
PUBLISHED BY THE ACADEMY.
1868.

LSoc 4687.6

(Vol. III. Pt. 2.)

1865, July 12. Gift of the academy.

HARVARD
UNIVERSITY
LIBRARY

(III. 3.)

1866, Sept. 8. By mail.

(III. 5.)

1868, Sept. 9. Gift of the academy.

(III. 1, 4.)

1877, March 19. Gift of Horace Davis of San Francisco.

[illegible]

The date of publication of each sheet will be found at the bottom of pages. The sheets of this volume have been circulated separately, and also in annual parts, as follows:

Part I, p. 1– 96, for 1863, printed in April to December, 1863.
" II, p. 97–176, for 1864, " January to December, 1864.
" III, p. 177–272, for 1865–6, " January, 1865, to August, 1866.
" IV, p. 273–360, for 1866–7, " January to September, 1867.
" V, p. 361–401, for 1867, " May, 1868.

A few copies of Vol. II, pp. 236, remain for sale by the Corresponding Secretary.

Volume I is out of print, but the Academy intends to reprint it when a sufficient number of copies have been ordered to refund the cost.

*The following Memoirs were also published by the Academy, in quarto, in* 1867.

No. I. Catalogue of Pacific Coast Mosses, pp. 38, . By Leo Lesquereux.
No. II. Natural System of Volcanic Rocks, pp. 95, . By F. Baron Richthofen, Dr. Phil.

ROOMS OF THE ACADEMY,
622 Clay Street,
*San Francisco, June*, 1868.

The Academy, desirous of increasing its numbers, and thus adding to its means of scientific research and diffusion of knowledge, has this year altered its title to that of "California Academy of Sciences," and invites all interested in the increase and spread of any branch of knowledge to join in its work. All gentlemen residing within one hundred and fifty miles of San Francisco are, by the new Constitution, eligible to resident membership, with all the privileges of those in the city, including free copies of the proceedings published after their election.

A copy of the new Constitution, Annual Address of the late President, Prof. J. D. Whitney, and list of members at the commencement of 1868, may be obtained free by addressing the Corresponding Secretary.

Meetings are now held on the first and third Mondays of each month, at the rooms of the Academy, where lectures are given, papers read and discussions held on scientific subjects. All desiring to become members may be introduced at the meetings on application to the officers and members.

Rooms open daily, from 12 to 1 o'clock, and the Librarian or other members are usually present.

## OFFICERS:

| | |
|---|---|
| *President*, . . . . . . . | James Blake, M.D., F. R. C. S., 206 Bush Street. |
| *Vice President*, . . . . . | James G. Cooper, M.D., 652 Howard Street. |
| *Secretary*, . . . . . . . | Theodore Bradley, Principal Boys' High School. |
| *Corresponding Secretary*, . | Henry N. Bolander, Principal Cosmopolitan School |
| *Treasurer*, . . . . . . . | Edward Bosqui, Publisher, 517 Clay Street. |
| *Librarian*, . . . . . . . | A. Kellogg, M.D., 622 Clay St., Academy's Rooms. |
| *Director of the Museum*, . | H. Bloomer, cor. Montgomery and Jackson Streets. |

## CURATORS.

| | |
|---|---|
| *General Zoology*, . . . . | E. F. Lorquin, 522 Pine Street. |
| *Conchology*, . . . . . . | W. G. W. Harford, 622 Clay Street. |
| *Radiata*, . . . . . . . | J. B. Trask, M.D., 206 Kearny Street. |
| *Entomology*, . . . . . . | R. H. Stretch, Room 50, Montgomery Block. |
| *Geology*, . . . . . . . | W. A. Goodyear, 615 Stockton Street. |

# PROCEEDINGS

OF THE

# CALIFORNIA ACADEMY

OF

# NATURAL SCIENCES.

## Annual Meeting, January 5th, 1863.

President in the Chair.

Twelve members present.

Ferdinand, Freiherr von Richthofen, was elected Corresponding Member.

The committee on the meteoric iron, presented to the city by General Carleton, reported that permission had been obtained by Professor Whitney to saw a piece from it for analysis, and for distribution to some of the most important collections in this country and in Europe. A piece will be forwarded to Professor Brush, of Yale College, for analysis, and a description of the mass published in the Proceedings of the Academy, as soon as the returns of the analysis have been received.

The Annual Reports of the officers of the Society for the past year (1862) were received, and the following is an abstract of their contents:

The Report of the Treasurer was read, and referred to the Finance Committee.

The Curator of Palæontology reported, that the number of specimens in the collection is 1,007, exclusive of numerous duplicates. They are principally from the cretaceous and tertiary formations of the Pacific coast. The collection has been rearranged in the course of the past year, and is now in as good condition as the accommodations of the Society will admit.

The Curator of Botany reported, that 2,160 specimens were added to the collection during the year 1862, making a total of 6,160 specimens in the Academy's herbarium. About twenty new specimens have been described in the Proceedings during the past year, and specimens and drawings of all of them have been placed in the collection. The herbarium is in good condition.

The Curator of Entomology made a verbal report, to the effect that the collections in his department, although small, are in good order; but that few additions had been made during the year.

In the Zoological department, the Curator stated, that a few valuable additions had been made to the collection during the year 1862; but that much difficulty was experienced in arranging them, from the limited space and means of the Academy. The alcoholic specimens have not been rearranged during the year; some are in bad condition. All has been done which could be, towards preserving the specimens in this department, with the means at the command of the Curator.

In the absence of the Curator of Conchology (Dr. Trask) it was stated, that the collection of shells had been arranged, and labeled, and placed in cases during the year; the accommodations of the Academy, however, do not admit of their being displayed.

The Curator of Mineralogy (Mr. Hanks) has removed from the city since the last annual meeting; but previous to removing, he had made considerable progress in rearranging and labeling the collection of minerals and ores, and it is now in better order than it has ever before been.

The Librarian reported that valuable additions had been made to the Library during the past year; chiefly through the instrumentality of the Smithsonian Institution. The books are in good order; but many of them need binding, and the want of room renders it impossible to place them where they can be easily got at by the members.

The committee on nominations reported the following list of officers for the year 1863, which was duly elected:

### PRESIDENT.

COL. L. RANSOM.

### VICE PRESIDENTS.

J. N. ECKEL, M.D., J. B. TRASK, M.D.

### CORRESPONDING SECRETARY.

W. O. AYRES, M.D.

### RECORDING SECRETARY.

PROF. W. H. BREWER.

### LIBRARIAN.

PROF. J. D. WHITNEY.

### TREASURER.

WILLIAM HEFFLEY.

### CURATORS.

| | |
|---|---|
| G. F. MOORE................. | Of Mineralogy. |
| W. M. GABB.................. | Palæontology. |
| A. KELLOGG, M.D............ | Botany. |
| J. G. COOPER, M.D........... | Zoology. |
| J. B. TRASK, M.D............ | Conchology. |
| H. BEHR, M.D................ | Entomology. |

Donations to the Cabinet were received as follows:

By Dr. Cooper—Specimens of *Purpura septentrionalis*, from San Francisco, and others from Oakland, of larger size—the latter not being natives of this Bay, but brought from Shoalwater Bay, W. T., in cargoes of oysters.

By Mr. Bloomer—A collection of specimens of wood.

Dr. Cooper exhibited a specimen of coral, of the genus *Porites*, probably an undescribed species. This mass of coral was drawn up by a fisherman, from a depth of four fathoms, at the Farallones, and deposited in the office of the Geological Survey by Mr. Lawson, of the Coast Survey. The same species had been previously obtained by Dr. Cooper in the Bay of Monterey, but it had never been found so far north before.

---

## Regular Meeting, January 19th, 1863.

Vice President, Dr. Trask, in the Chair.

Present, eleven members.

Dr. W. W. Hays, U. S. A., and Mr. William Ashburner were elected Resident Members.

Donations to the Cabinet were received as follows:

A miscellaneous collection of plants, consisting of from two hundred to three hundred species, from the Pacific slope, by H. G. Bloomer; specimens of a *Yucca*, and of *Larrea Mexicana*, from Kern river, by J. E. Clayton.

Mr. Bolander presented the following paper:

### Description of a New Species of Melica.

BY H. N. BOLANDER.

MELICA L.

*M. stricta* Bolander.

Spikelets very large, secund, horizontal, four to six-flowered; flowers stipitate, upper ones imperfect and abortive, slightly tinged with purple.

Glumes equal, oblong, membranaceous, five-nerved; nerves evanescent at about three-quarters the length of the glumes; scarious margined and pointed, nearly the length (one-half inch) of the flowers.

Paleæ very unequal, chartaceous; lower oblong, seven-nerved, all except the middle one evanescent at about two-thirds the length of the palea; scabrous, largely scarious margined and pointed; upper palea spathulate, bicarinate, ciliate, one-third shorter than the lower.

Ovary obovate, contracted near the truncated apex, sessile, smooth; styles terminal, divergent; stigmas plumose; pilis fasciculate, minutely serrate; squammulæ very small, connate, entire; stamens three; caryopsis?

Root perennial; culms upright, terate, striate, one and one-half feet high, very brittle; sheaths striate, scabrous; ligula exserted, lacerated; leaves narrow, one-sixteenth to two-sixteenths of an inch wide, acuminate, outside and margins scabrous, (four to seven inches long) striately nerved, upright, nearly appressed.

Raceme upright, rather simple; branchlets smooth, appressed, few-flowered; pedicels pubescent at the angle.

Collected by Mr. George W. Dunn, at Silver City, Nevada Territory.

## Regular Meeting, February 2d, 1863.

President in the Chair.

Present, fourteen members.

Prof. P. P. Carpenter, of Manchester, England, was elected a Corresponding Member.

Donations to the Cabinet were received as follows:

Three jars of reptiles and fishes, collected by Mr. J. Xantus, in Lower California, and mostly near Cape St. Lucas, were presented by Mr. Samuel Hubbard.

Donations to the Library:

Volumes 1–27 of the Edinburgh Philosophical Journal, by H. G. Bloomer. Proceedings of the Philadelphia Academy of Natural Sciences, for October, November, and December, 1862, from the Society. Descriptions of shells collected in the Rocky Mountains in 1860 by Dr. J. G. Cooper, by T. Bland and J. G. Cooper.

The Publishing Committee laid volume two of the Proceedings of the Academy, for the years 1858–62, upon the table: it was ordered by the Academy that one hundred copies be sold to the members at one dollar per copy, and that fifty copies be presented to the Smithsonian Institution for foreign distribution.

Professor Whitney read the following communication:

## On the Inaccuracy of the Eighth Census, so far as it Relates to the Metallic and Mineral Statistics of the United States.

BY J. D. WHITNEY.

It has, for a long time, been a subject of regret, that our United States Census returns are so imperfect; and that, in all that relates to mining and metallurgy, they are especially and extraordinarily unreliable. Mr. Kennedy's "Preliminary Report on the Eighth Census," (1860), recently issued, is at hand, and some remarks may here be made in reference to what appears in it, which is connected with our mineral interests. It will soon appear, from an examination of this public document, that the same unfortunate ignorance in regard to one of the most important of the sources of our national wealth, which has characterized previous Census Reports, still prevails among our officials at Washington; and that all which Mr. Kennedy's Report contains must be taken with many grains of allowance. It is certainly the duty of those who are better posted to give notice of these deficiencies, and to call public attention to them again and again, in the hope that something may be done, hereafter, to make this department of the Government less ridiculous in the eyes of those who are acquainted with such matters, and less liable to mislead those who look on a Census Report as something to be blindly quoted, and relied on as a document which must necessarily be correct.

The only metals in regard to which anything is stated in Mr. Kennedy's report are iron, nickel, lead, zinc, and copper; thus omitting gold, silver, and quicksilver, of each of which we are large producers. Of the mineral productions, coal is the only one noticed.

The first metal mentioned in the text accompanying the tables compiled from the Census returns is iron, and the quantity of pig iron produced in 1860 is given at 884,474 tuns, valued at $19,487,790, and this is stated to be an increase in the value returned by the Census of 1850, of 44·4 per cent.

Here the question arises, how far are these figures to be relied on as accurate? This can only be decided by comparison with returns known to be approximately accurate, and of these we have none later than the year 1856, in which year the make of pig iron was ascertained, by the Iron-Makers' Association, to be 812,917 tuns. Either the Census returns of 1860 are too low, as they were in 1850, or else the increase in this branch of our industry has been very slight since 1849, when the make of iron was ascertained by the Pennsylvania Iron-Masters to be 800,000 tuns. On the other hand, assuming the Census returns of 1860 to be correct, there is no ground for making the statement, as is done by Mr. Kennedy, that there has been an increase of 44·4 per cent. in the value of the iron produced in 1860 over that of 1850; it is evident that the increase has been very slight, since 1846 or 1847 even, in which years the make of this metal, on reliable authority, reached nearly 800,000 tuns.

But what shall we say of Mr. Kennedy's method of arriving at the production of iron, as related to the amount of population in the United States, or the number of pounds produced per head? To obtain this, he adds together the amount of pig iron and the amount of bar and other wrought iron produced, and thus obtains a result of 92 pounds of iron produced for each inhabitant of the United States; which, as he says, "speaks volumes for the progress of the nation in all its industrial and material interests." It speaks a volume or two for his own ignorance of the elements of metallurgy; since, as everybody, except the Superintendent of the United States Census, knows, the bar and rolled iron is nearly all converted from the pig, and only a small proportion made direct from the ore; so that his method of computation is as near correct as it would be, for instance, to estimate the amount of beef consumed per head in San Francisco, by adding the weight of all the cattle slaughtered in the city to that of the beef produced by said slaughtering. As, in 1856, only 28,433 tuns of bar iron were made directly from the ore, to 812,917 of pig produced; so, allowing that 28,000 tuns were made direct in 1860, the amount, per head, of all the iron made in that year would be 65 pounds, instead of 92, as Mr. Kennedy calculates.* Taking the population of the United States at 23,000,000, in 1850, and the make of iron at 800,000 tuns, as given by the returns of the Commission of the Iron-Masters of Pennsylvania, the amount produced, per head, in that year, would be 78 pounds; so that all Mr. Kennedy's glorification goes for naught, unless we admit that his returns for 1860 are wrong.

In regard to the statistics of the other metals mentioned in the Census Report, it may be said, with truth, that they are very defective. No mention is made of gold, silver, or mercury, the value of the first-named of which produced in this country is nearly double that of all the other metals. Under zinc, there is no mention made of New Jersey, the great zinc-producing State. The yield of lead in the Mississippi Valley is put down at considerably less than its real amount.

But the most important remark to be made, in this connection, is in reference to the mode of reporting the results adopted by Mr. Kennedy. Instead of giving the amount of *metal* produced, the number of tuns of *ore* is stated, and no clue given to the yield of the ore. This is something as an assessor's report would be, which should give the valuation of the individuals he might be called on to appraise, in *pieces of money*, leaving it uncertain whether five cent or twenty dollar pieces were intended.

The table given by Mr. Kennedy does not state what amounts of each metal are produced; and, if we attempt to arrive at them by examining the columns of values, it is found to be impossible to decide whether these values are those of the ore as mined before being smelted, or of the metals produced from them. In short, the whole matter is left in such obscurity, that it is much to be wished that the table could be expunged from the Report, as it can only serve to mislead and confuse those who resort to Government documents for information in regard to our metallic and mineral productions.

---

* In point of fact, the amount of bar iron made in the bloomery furnaces direct from the ore is growing less every year, and must be now reduced to a very small figure.

Dr. Cooper remarked that, since the publication of his paper on Californian Mollusca, read before the Academy November 3d, 1862, (see Proceedings, vol. II, p. 202) he finds the generic name STRATEGUS preoccupied, and he now proposes, in its place, the name NAVARCHUS.

Professor Whitney exhibited a magnificent specimen of auriferous quartz, in which the gold was associated with *Mispickel*, (Arsenical Pyrites.) The weight of the mass was about five pounds, and the value of the gold estimated at $1,500. It was obtained from the celebrated "Fellows Lode," on the Middle Yuba, in Sierra County. It is stated, on what is believed to be reliable authority, that from $200,000 to $250,000 has been taken from an excavation on the lode only ten feet long and four feet wide, by crushing in hand-mortars. The occurrence of gold in connection with mispickel, in the California mines, seems to be rare, at least in the southern counties. In the specimen presented, the gold formed a coherent, sponge-like mass, when the mispickel was dissolved.

Baron Richthofen remarked, that gold occurs associated with mispickel in Silesia.

Mr. R. L. Harris made some remarks on the comparative friction of car-wheels, on an iron track, when rolling and sliding, as shown by experiments made on the street-railroad in Washington street. Here the greatest grade is five hundred and twenty-eight feet per mile, or one in ten, and it is found that, on a wet day, if the wheels are stopped by the brakes, they will slide on the track; while, if the brakes are not put down so hard but that the wheels can revolve, the car is entirely under control. This is not the popular opinion, and the authorities generally state, that the sliding friction is the greatest; but experience shows, that the friction is really greatest when the sliding and rolling motions are combined.

## Regular Meeting, February 16th, 1863.

President in the Chair.

Fourteen members present.

Donations to the Cabinet were received as follows:

From J. E. Clayton, Esq., a set of ores from the Russ District, California.

Donations to the Library:

Proceedings of the Zoological Society of London for the year 1857: from Dr. Cooper. Astronomical and Meteorological Observations, made at the U. S. Naval Observatory during the year 1861: from the U. S. Naval Observatory.

Dr. Kellogg read the following paper:

## Description of two New Species of Plants from Nevada Territory.

BY A. KELLOGG, M.D.

### Aplopappus Cass.

*A. Nevadensis* Kellogg. [Fig. 1.]

Suffrutescent, caudex branching, branches three to four inches in height, somewhat ascending; rigid, striate, scabrous throughout. Heads solitary and terminal, homochromous and many-flowered. Leaves alternate, crowded near the base, oblanceolate, very acute, quite entire, three-nerved; the reticulate veins and nerves prominent, sub-petiolate (half to one inch in length, by about one-fourth in breadth); the lowermost leaves more distinctly petiolate, spatulate, obtuse, or sub-acute; upper cauline leaves few or solitary, lanceolate, very acute or acuminate, three-nerved.

Involucre campanulate, the greenish somewhat foliaceous scales rigid, many-nerved, (chiefly three to five) margins scarious, cleft-ciliate, or somewhat fimbriate, oblanceolate, acute, in three series, often one or two bractoid scales at the base.

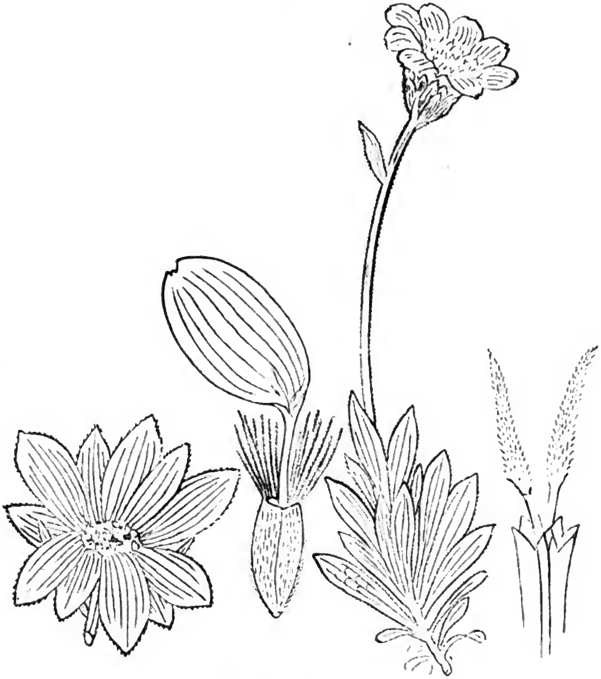
Receptacle flat, alveolate; alveoli toothed, naked. Rays (about eight) orange-yellow, oblong-oval, two or three-toothed, pistillate, fertile, tube slender, about as long as the achenia, or one-third to half the length of the ligule.

Disk corolla cylindrical, slightly expanding, five-toothed, erect, glabrous. The achenia (about twenty, including the ray) angular oblong, somewhat compressed; base cuneate, satiny appressed pubescent (with white hairs); pappus of unequal capillary scabrous bristles, rigid and fragile, or deciduous.

Appendages of the style much longer than the stigmatic portion, lance-subulate, hispid, much exsert, erect-spreading.

This plant was brought from Nevada Territory by Mr. Herbert C. Dorr.

FIG. 1.



MIRABILIS L.

*M. Californica* Gray, Var. *villosa* Kellogg.

Stem about a foot in height, somewhat ascending, flexuous, divaricately branching, nodose, internodes slightly curved; minutely villous throughout. Leaves rounded-cordate, obtuse, entire, three to five-nerved; the uppermost ovate-cordate, petioles short, (one-fourth to one-sixth the length of the lamina.

Flowers pedicellate, in loose terminal dichotomous panicles, with a solitary flower in the axils; perigonium pink, pedicels recurved in fruit.

This plant, from the interior—Devil's Gate and Carson River—differs much from the plate of the coast plant of the Mexican Boundary Report. It is not at all "glabrous," nor are the flowers "sub-sessile;" the pairs of leaves are remote, with a much more open and spreading aspect; the flowers are pentandrous and deciduous.

Mr. Harris exhibited a section of a pile, from a wharf at Rincon Point, which fell a few days since, having been destroyed by the boring of the *Teredo*, (properly a *Xylotrya.*) The material of the pile is Oregon pine; it had been in the water less than six years, but is now completely perforated in all directions. The subject of the best means of protection for piles, against attacks of the *Teredo*, was discussed at some length by various members.

Dr. Ayres stated that, as yet, no reliable preventive had been discovered, except that of sheathing the pile with metal. Several years ago the same subject came before the Academy, and Drs. Ayres and Trask were appointed a Committee to investigate the subject. All external applications which have been proposed fail in practice, from the wearing away of the surface by the waves, and they are but little better than the natural bark. It has not appeared that the saving in time was equal to the expense incurred by thus protecting the piles. At Boston, where there are two species destructive of timber, they find no preventive, short of sheathing the piles with copper.

In the French works on this subject, it has been stated that the bark affords no protection; but, on the contrary, aids the young animals in introducing themselves into the wood. This has not been found to be the case in this bay, where the bark does, on the contrary, assist in preserving the timber.

The fact was also stated, by one of the members, that the piles of the wharfs in the southern part of the city suffer much from attacks of the *Teredo;* while those of the northern portion are comparatively exempt. The fact was mentioned, that piles have been entirely destroyed here in six months from the time they were placed in the water.

Prof. Brewer made some remarks on the method of calculating altitudes by observation with a single barometer. He gave an account of the methods adopted by the Geological Survey for computation, in cases where there was no station barometer nearer than the bay, or the valley of the Sacramento.

Dr. Trask mentioned that the weight of the Honcut meteoric iron presented by him to the Academy, at the meeting of March 17th, 1862, was six ounces, one hundred and twenty-eight grains, troy.

Professor Whitney called attention to the curious errors in a paper published in Petermann's Mittheilungen, 1861, page 133, which purports to be a translation into German of a portion of a work published by Mr. J. Xantus, describing his journey in Lower California. He describes a quicksilver mine of great importance as being worked at Marques; but the description which he gives of it shows that it is the New Almaden mine which, in reality, he visited, and which, by some confusion of his notes, he has located in Lower, instead of Upper California. No mercury mine is worked on the California peninsula, so far as can be ascertained. It is evident that Mr. Xantus's notice of rich gold, lead and copper mines on the peninsula must be taken with many grains of allowance.

On motion of Dr. Ayres, it was ordered, that twenty-five copies of the second volume of the Proceedings be placed at the disposal of the Publishing Committee for distribution to learned societies, public libraries, and distinguished scientific men in the Atlantic States.

## Regular Meeting, March 2d, 1863.

President in the Chair.

Present, fifteen members.

Dr. J. P. Kirtland, of Cleveland, Ohio, was elected a corresponding member.

Donations to the Cabinet.

By Mr. Rowlandson, specimen of the wool of the Alpacca and Vicuña, brought from Peru by Capt. Bissell, of the United States sloop-of-war *Cyane*.

Donations to the Library.

The American Journal of Science, for January, 1863, from the editors.

Mr. Gabb communicated two papers by Mr. Rémond, containing descriptions of new fossils from California.

## Description of two New Species of Bivalve Shells, from the Tertiaries of Contra Costa County.

BY AUGUSTE REMOND.

### CARDIUM Brug.

*C. Gabbii* Rémond.

Shell cordate, ventricose, nearly equilateral; posterior side truncated, direct; anterior side slightly depressed; height and length nearly equal. Umbones very prominent; beaks incurved, approximate; lunule well marked, carinated; surface even, with fine imbricated lines of growth. Hinge (of the left valve) comparatively narrow; anterior fosset small, shallow, triangular; cartilage pit large, deep, long; lateral teeth heavy, thick, prominent.

Locality: vicinity of Kirker's Pass, south of New York (of the Pacific) Plain from a late tertiary deposit.

The *C. Gabbii* will easily be distinguished from any other species yet discovered. from its heavy hinge and enormous lateral teeth. I take great pleasure in dedicating this beautiful fossil to Mr. W. M. Gabb, to whom I am indebted for repeated assistance in my palæontological studies.

This species occurs in shelly sands, together with *Tapes regularis* Gabb and *Murex ponderosus* Gabb, two other extinct species. The specimens are in the collection of Mr. W. M. Gabb and my own.

### OSTREA L.

*O. Bourgeoisii* Rémond.

The description is from two lower valves, from the collections of Mr. l'Abbe Bourgeois (Pont-Levoy, France) and Mr. Pioche, (San Francisco.)

Shell sub-oval, higher than long, strongly contracted near the cardinal area, sub-rounded on the ventral margin; inferior valve comparatively thin, convex, irregular exteriorly, with remote, somewhat rugose, plaits of growth. Ligament fosset long, profound, minutely wrinkled and finely striated, oblique and turned downwards; muscular impression very large, oblique, and sub-central. somewhat prominent.

Locality: vicinity of Kirker's Pass, from a late tertiary bed.

I dedicate this new species to Mr. Bourgeois, Professor of Natural History at the School of Pont-Levoy, (Loir-et-Cher, France) who was my first teacher in geology.

## Description of two Species of Scutella.

BY AUGUSTE REMOND.

### SCUTELLA Lam.

*S. Gibbsii* Rémond.

Disk oblong-sub-oval, rounded before and truncated behind, posteriorly convex above, slightly depressed in front; inferior surface flat, somewhat concave about the mouth. Apex about midway between the center and posterior margin; ambulacral star non-symmetrical; petals unequal, open at their extremities. Anterior petal straight, longer than the others; the lateral ones nearly straight, diverging from the apex with an angle of about eighty degrees; posterior petals very short, sub-oval, having the anterior side most curved. Four rows of pores in each petal; the inner pores transverse, the outer ones pointed obliquely inwards. Mouth posteriorly sub-central; anal-aperture small, submarginal. Ambulacral furrows double, nearly symmetrical, slightly ramified. Each ambulacral and inter-ambulacral space is occupied by two rows of irregular plates, either pentagonal or hexagonal. Tubercles numerous, crowded in the ambulacral furrows, but much worn off in the specimens examined.

Locality: Kern Lake, Buena Vista County.

The specimens described are in the collection of the Academy; they were found by Dr. Gibbs, to whom the species is dedicated.

Obs.—This species, considered by Mr. Gabb as of probably miocene age, is closely allied to the *S. striatula*, which is found living on the Californian coast, and occurs fossil in the *faluns* (miocene formation) of Bordeaux, France; but it differs from it in the outlines and the size of the shell, the former being comparatively small and longer than broad, while the latter is broader than long. Besides, the apex of the *S. Gibbsii* is situated more posteriorly, and the lateral petals, in the *S. striatula*, diverge from the apex, with an angle of from one hundred and ten to one hundred and fifteen degrees; this latter has also its ambulacral furrows more ramified at their extremities.

### *S. interlineata* W. P. Blake.

Disk sub-circular, broad, upper surface convex towards the middle, depressed on the margins, plane beneath; apex central; ambulacral star symmetrical; petals long, equal, closed at their extremities, nearly reaching from the apex to the margin of the shell, terminated by five or six irregular hexagonal plates. The petals are longitudinally divided into four rows, which are connected by numerous and regular transverse lines of pores. Mouth central; anus submarginal; ambulacral furrows symmetrical, not much ramified. Inter-ambulacral areas occupied by two rows of pentagonal plates, convex, of equal length, increasing in size until they unite with the ambulacral plates; hexagonal from that point and decreasing towards the margin.

Two sorts of appendages; spinous processes numerous and crowded, above and beneath. Spines of the superior surface short, striated, pyriform, irregularly pentagonal or hexagonal; inferior spines slender, comparatively long, dentaliform, striated longitudinally, tubular and round.

Obs.—Water-worn fragments of this fine fossil occur in abundance on the beach, between Merced Lake and the Pacific, south of Point Lobos, in San Francisco County. It was made known to science by Mr. W. P. Blake, Geologist of the Railroad Survey, who found it in 1853, among the shingles thrown up by the surf, and first described by Mr. W. Stimpson. At that time the locality whence the scutellæ were derived had not been discovered, so that the specimens obtained being imperfect, no complete description could be made;

this is the reason why I offer a new and complete description of the *Scutella interlineata*, from specimens procured *in situ*. As was suggested by Mr. W. P. Blake, the rocks bearing these fossils are found a few miles southward, north of the boundary line between San Mateo and San Francisco Counties, where the scutellæ stick out from conglomeratic sandstones, which Mr. Gabb considers as belonging to the *pliocene* or *post-pliocene* formation; we find them in a fine state of preservation, with their spines retained.

The *S. interlineata* is figured in the Railroad Reports; see vol. V, Geological Report, plate IV, fig. 30; and for Mr. Blake's remarks and Mr. Stimpson's description, the same Report, chap. XII, p. 153.

Dr. J. Blake made some remarks on specimens, presented by him, of infusoria, found in the sand-hills, south of Point Lobos, and which form a kind of concretions, fixing the sand in its place.

Dr. Ayres made the following remarks in relation to the genus NOTORHYNCHUS:

This genus was defined by me in 1855 (Proc. Cal. Acad. Nat. Sci., vol. I, p. 72) to include a species occurring in the Bay of San Francisco. In 1858 Girard refers to the species (P. R. R. Rep., vol. X, p. 367) under the generic name HEPTANCHUS, of which he considers NOTORHYNCHUS a synonym. In 1861, Mr. Gill refers it to Rafinesque's genus HEPTRANCHIAS. (Annals of the Lyc. Nat. Hist., N. Y., vol. VIII, Dec.) In a more recent paper (Proc. Acad. Nat. Sci., Phil., Oct., 1862) Mr. Gill restores my species to the name under which it was originally described. He says: "This generic name of NOTORHYNCHUS was proposed by Dr. Ayres under a misapprehension." My "misapprehension" was that I regarded the species as the type of a new genus; a conclusion at which Mr. Gill himself has, after several changes, also arrived. He gives as a synonym of NOTORHYNCHUS only "HEPTANCHUS, Sp. Muller and Henle, Gray, Girard, Gill," whereas it is necessary to include also "HEPTRANCHIAS, Gill," as above indicated.

I may remark that the description given by Mr. Gill of the teeth of *Notorhyncus maculatus*, (Proc. Acad. Nat. Sci., Phil., Oct., 1862, p. 495) will not bear examination. It represents the individual specimen on which it was founded; but the species is quite common here, and I find that the number and the forms of the teeth vary so much, that my original description, which Mr. Gill says is "equally applicable to any species of the family," is fully as close as nature will allow us to draw. I am at a loss to understand how it is possible for him to refer the jaws of a shark, collected at a point so far removed from us as Nisqually, to my species, when my description is so extremely indefinite.

Professor Whitney gave an account of an interesting collection of Japanese minerals and fossils, in the possession of J. H. Van Reed, Esq., of this city.

This collection comprises over one thousand specimens of rocks, ores, fossils, and miscellaneous objects of natural history. It is supposed that they are chiefly of Japanese origin; but, as there is among them a fragment of a Dutch tobacco-pipe, carefully labeled, there may be other objects in the collection from foreign countries. The articles are all labeled, in the Japanese language: they are carefully fastened to the cases in which they are arranged, with exquisite Japanese neatness. The small crystals are inclosed in glass receptacles, having nearly the form of two large watch-crystals, attached to each other by the edges.

In the general character of the specimens in this collection, a singular resemblance was noticed to the productions of California, especially in the fossils and silicified woods, of which latter there are a number of beautiful specimens. There are several bivalve shells of pliocene or miocene tertiary age, and some casts of gasteropods, exquisitely formed in chalcedony. A number of sharks' teeth, of the genus *Lamna*, were also noticed. Among the fossils is a single shell of palæozoic age, a *Spirifer*; it is not impossible, however, that this may have been carried from China to Japan; at all events, a *Spirifer* from that country resembling this, and of Devonian age, has been described in the Proceedings of the Geological Society of London.

There are quite a number of specimens of copper ore in the collection; they are all of the common yellow sulphuret, (chalcopyrite) except one or two of erubescite. This would indicate that the principal ore of this metal in Japan, as in other countries, is the sulphuret of copper and iron.

Native gold in quartz is also present in the collection; but no ores of silver were noticed, except one specimen of steel-grained galena, which is probably argentiferous. There are several specimens of realgar. Among the other minerals noticed were: calcite, adularia, chalybite, in the form of *flos ferri*, garnets, small crystals of pyroxene, crystals of mica, pectolite, and another zeolitic mineral resembling Thomsonite, as also native sulphur, obsidian, and a variety of volcanic rocks and lavas.

The collection is quite interesting, and would be more so if the labels could be read. The principal inference to be drawn from it, is the predominance of volcanic formations, and of the later tertiary strata, in the region in which this collection was made.

Dr. Ayres called attention to a remarkable turtle, in the possession of Mr. Van Reed, known as the "Sacred Turtle" of the Japanese. It is a species of Emys, closely allied to *E. terrapin*. Its marked peculiarity is, that its back is covered by a growth of *conferva*, which is often several inches long, and which gives the animal its sacred character among the Japanese, who believe this growth to be *hair*. The species is allied to *C. rivularis;* but the cells are more elongated. Dr. Ayres stated that he had observed a growth of *conferva* on various aquatic and amphibious animals in New England, and that, in these, it was always attended by disease, with more or less ulcerated at the roots. He was satisfied that this was always the case with fishes exhibiting this growth. The turtle in question, however, does not show any evidence of disease.

Dr. Ayres made some further remarks on the similarity of the fishes of Mr. Van Reed's collection to species found in California.

Mr. Gabb noticed a resemblance in the fossils to those of this State.

---

## Regular Meeting, March 16th, 1863.

President in the Chair.

Nine members present.

The attention of the Academy was called to the fact that the names of Dr. W. Newcomb, of Oakland, and of Mr. H. C. Bennett, of Columbia, both Corresponding Members of several years' standing, had been omitted from the published list.

Donations to the Cabinet were received as follows:

Specimen of tree cotton, from near Mazatlan, Mexico; presented by Dr. Trask.

Donations to the Library:

Alternate generation of Annelids, by A. Agassiz. Proceedings of the Boston Natural History Society, vol. IX, sheets 1 and 2. Report of the Trustees of the State Lunatic Asylum for 1862.

Dr. Kellogg read the following paper:

### Description of two New Species of Collomia from Nevada Territory.

BY A. KELLOGG, M.D.

COLLOMIA Nutt.

*C. tinctoria* Kellogg. [Fig. 2.]

Stem erect, slender, one to three inches in height (often so minute as to appear almost stemless) villous and pulvurently viscid glandular throughout. Leaves opposite, lower pair oblong-spatulate obtuse, lamina slightly decurrent down the petioles: those above, lanceolate, petiolate, acute, or acuminate, mucronate, one-nerved, quite entire.

The minute yellow flowers crowded at the summit in pairs, from the axils of the much abbreviated branchlets, short, pedicillate; and with the long, narrowly lanceolate, acuminate, bractoid leaves aggregated into a somewhat dense,

FIG. 2.

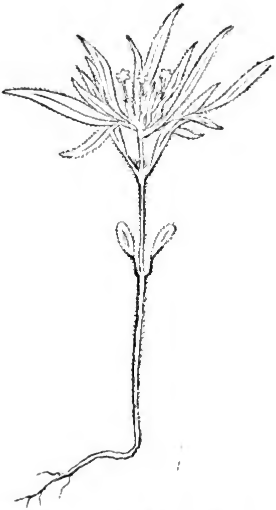
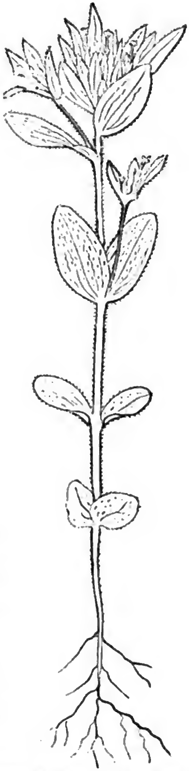


FIG. 3.



subsessile head. Calyx obconic, membranaceously diaphanous at the base; segments green, cup prismatic (or pentangular); also with five prominent processes, or folds, at the clefts, the semi-lanced segments acute, or acuminate, subulate pointed, three-nerved.

The filiform flowers twice the length of the calyx, border spreading, tube contracted below, stamens equal, or sub-equal, inserted into the throat; capsule obovate, emarginate.

A very diminutive species from the western slope of the Sierra Nevada Mountains, found by Mr. Herbert C. Dorr. The plant yields a beautiful yellow dye, hence the specific name.

*C. micrantha* Kellogg. [FIG. 3.]

Plant upright, simple, or branching above; somewhat viscid-pubescent.

Lower leaves opposite, ovate, obtuse, petioles very short; middle cauline leaves ovate-oblong, obtuse or subacute, corneously mucronate, sessile or subsessile, three to seven-nerved; upper leaves mostly alternate, all somewhat silky, viscid-pubescent. Flowers pedicillate, axillary and terminal in a condensed, subcymose head; calyx lobes sub-equal, linear-lanceolate, often sub-spatulate, acute, corneously mucronate, three-nerved, ciliate, cleft to the middle (membranous between the segments as in *Gillia*).

Flowers filiform, very minute, one-third to one-half longer than the calyx: border blue, throat slightly swelled, stamens included, three long and two short. style simple, stigma undivided, about as long as the tube. Capsule oval, compressed (?), about three-seeded, seeds oblong, cuneate, flattened.

A plant four to six inches in height, found by Mr. G. W. Dunn, in the vicinity of Silver City, Nevada Territory. In one of the specimens the first pair of leaves appears to manifest a serrate tendency.

Dr. Trask stated, that the tree cotton presented by him was said to be the produce of a shrub from four to fifteen feet high. It is described as growing in a pod like a banana, the shrub forming a high chaparral. The staple is long and fine; but nothing is known of its commercial value.

Dr. Behr remarked that it closely resembled species of BOMBAX and ERIODENDRON, abundant in South America and the East Indies, but not there considered as of value as a substitute for cotton.

Dr. Trask made some remarks in regard to certain species of CONFERVA, which appear to be sensitive, like the species of SCHRANKIA.

Prof. Brewer stated that he had recently received a communication from Professor Planchon, of South France, in regard to suitable forage plants for dry regions. In that country the *Medicago sativa*, or Lucerne, was considered the most valuable, and next to it the Sainfoin.

---

## REGULAR MEETING, APRIL 5th, 1863.

President in the Chair.

Present, ten members; and Mr. W. S. Moses, by invitation.

Donations to the Library:

Chart of the oscillations of the Sacramento River, by T. M. Logan, M.D. Proceedings of the Philadelphia Academy of Natural Sciences, for September, 1862. Journal of the Boston Natural History Society, volume VII, Nos. 2 and 3.

Dr. Kellogg read the following paper:

## Description of a New Genus and Species of Plant from Nevada Territory.

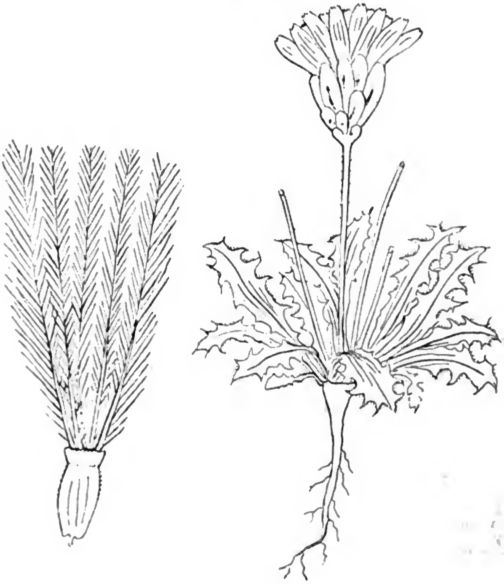
BY A. KELLOGG, M.D.

### PTEROSTEPHANUS Kellogg.

Involucre obconically-companulate; scales loosely imbricated in about two to three series; the exterior unequal, calyculate, suborbicular, oval, or oblong, obtuse; the inner series (of about eight) sub-equal, oblong-lanceolate, obtuse; scarious margins entire; (a broad, diffusely green line marks the centre). Receptacle naked, alveolate, alveoli, toothed. Achenia (mature wanting), oblong, sub-cuneate, or sub-obovate, somewhat compressed (?), slightly contracted at the crown, smooth, sub-pubescent above, on a short stipe. Pappus double; the exterior coroniform, persistent—a hyaline crateriform cup, with an even but minutely crenulate edge; interior of five (white) plumose, glabrous bristles, gradually dilating towards the base.

Californian herbs, with runcinately, pinnatifid, radical leaves, and numerous naked scapes, bearing solitary, tigulate, yellow flowers; closely allied to *Malacothrix* and *Calycoseris*, but with a plumose pappus.

FIG. 4.



*P. runcinatus* Kellogg. [Fig. 4.]

Acaulescent, several naked scapes, two to four inches high, sub-glabrous, (rarely a few scattering glandular hairs); leaves radical, runcinately pinnatifid. lobes spinulose, frosty, or sub-wooly, pubescent, three to seven-nerved, short petioles winged, dilated at the base; rosulate, from a simple perennial somewhat fusiform root.

Professor Whitney exhibited a new mass of meteoric iron, found near La Paz, on the Colorado River, in New Mexico, by Hermann Ehrenberg, Esq. A description and analysis will be furnished at a future meeting.

## Regular Meeting, April 20th, 1863.

Vice President, Dr. Trask, in the Chair.

Present, seven members.

Philip Lutley Sclater, Esq., of London, England, was elected a Corresponding Member.

Donations to the Cabinet:

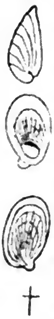
Three species of Reptiles from San Mateo, and one from Marin County, collected and presented by Mr. Bolander.

Dr. Cooper communicated the following description of a new Californian Mollusc, discovered by Rev. Joseph Rowell, at Marysville, in the waters of Feather River.

### Gundlachia Pfeiffer.

*G. Californica* Rowell. [Fig. 5.]

Fig. 5.



Shell with the aperture sub-oval, obliquely expanded towards the left, posteriorly ronaded, and wider anteriorly. Internal shelf reaching forward about one-fifth the length of the shell, its margin slightly concave and oblique.

Dorsal surface convex, becoming somewhat keel-shaped towards the apex, which is strongly and obliquely deflected so as to make the right border nearly a straight line, while the expansion on the left projects nearly as far back as the apex, as an obtuse angle. Structure corneous, with strong concentric lines of growth, and faint radiating striæ. Color dark brown, opaque; inner surface shining and purplish, the plate white towards the edge, and in some specimens showing a thickened, white semicircle continuous with its margin across the arch of the shell.

Length about sixteen one-hundredths, breadth eight one-hundredths, and height six one-hundredths of an English inch.

More than fifty specimens were found on water plants in clear stagnant ponds, two or more often sticking on the back of a larger one.

The discovery of this little shell in California is of great interest, the only species hitherto known being found in Cuba. The generic characters of this shell are strictly parallel with that species, while those mentioned as specific easily distinguish it. The Cuban shell is more elongated, regularly oval, the apex projecting considerably beyond the margin of the aperture, which is not obliquely expanded posteriorly. Its size is about one-fifth larger than that of ours. According to Bourguignat, the young shell is a simple obtuse cone, with a semicircular aperture formed by the edge of the shelf, and the thickened dorsal margin; but as it grows, the animal changes the form of the aperture until the opening beneath the shelf becomes like the small end of a broad funnel, which in some of our specimens is still shown by the white semicircular ring.

The shell much resembles that of the marine *Crypta* (*Crepidula*), and also *Navicella* of tropical estuaries; but the animal is quite different in the Cuban species, and will undoubtedly prove so in the Californian.

Mr. Hanks mentioned that he had collected about two hundred specimens of minerals for the Academy in Owen's Lake Valley, and that there were also some bones with them from a well thirty feet deep, presented by Mr. H. M. McCormick; all of which would be forwarded to San Francisco as soon as possible.

---

## REGULAR MEETING, MAY 4th, 1863.

President in the Chair.

Present, eleven members.

Donations to the Cabinet were received as follows:

A collection of pine cones, from H. G. Bloomer. A specimen of rock, containing cretaceous fossils, from the vicinity of Fort Tejon (?), by E. T. Schenck. Two specimens of *Monocentris Japonicus* Cuv. from Dr. Ayres.

Donations to the Library:

Commercial Relations of the United States for the year ending Sept. 30th, 1861, from the Department of the Interior. Classification of the Coleoptera of North America, by John Le Conte, M.D., Part I. Smithsonian Instructions for collecting eggs and nests of North American birds. Smithsonian Directions for collecting, preserving, and transporting specimens of Natural History: the three last-named volumes were presented by Dr. Ayres.

Professor Whitney read the following communication in regard to the progress of the State Geological Survey of California.

The Act of the Legislature authorizing a geological survey of this State was approved April 21st, 1860; but operations were not commenced until about the first of December of that year, consequently the work has been in progress for a little more than two years.

The plan of the survey, according to the requirements of the act by which it was organized, demands "an accurate and complete geological survey of the State," and a report containing "a full and scientific description of its rocks, fossils, soils, and minerals, and of its botanical and zoological productions." Provision is also made for the collection of specimens in all departments of geology and natural history, which specimens are to be deposited "in such place as shall be hereafter provided for that purpose by the Legislature."

The following persons have been employed on the survey since it was commenced: Professor W. H. Brewer, as Principal Assistant, and specially in charge of the department of Botany and Agricultural Geology. Professor Brewer, however, up to the present time, has been chiefly engaged in the geological field work of the Survey. Mr. William Ashburner was employed from the commencement of the work, up to the spring of 1862, in the field; and, for a considerable portion of the time, in examining the gold-quartz mines and machinery in the principal mining counties of the Sierra Nevada. Mr. A. Rémond served as volunteer, in the field work, during the season of 1862. Mr. W. M. Gabb took the place of Palæontologist to the Survey at the beginning of the year 1862, which position he still continues to hold. Mr. C. Averill was connected with the Survey from its commencement up to the month of February last, as Clerk, Commissary, and Barometrical Observer. Dr. J. G. Cooper has been in charge of the department of Zoology, and has been employed, at intervals, as the financial condition of the Survey permitted, since July 1st, 1861. In the topographical department, Mr. C. F. Hoffmann has been employed constantly since March, 1861; and Mr. V. Wackenreuder, at intervals, during the past year.

The uncertainty peculiar to all undertakings of this kind in the United States, arising from the necessity of appealing to each successive Legislature for the means of carrying on the work, and the disturbed state of the country during the whole time since we commenced operations, as also the unfortunate condition of the finances of the State, which has kept the treasury from one to two years behind in the payment of the legislative appropriations, have combined to render it difficult to arrange and carry out as systematic a plan for the conduct of the work as would, under more favorable circumstances, have been practicable.

Two ideas have, however, as far as possible, governed the survey in its operations: the first was, to make, as rapidly as could be done, a reconnoissance of the State, with the view of acquiring a knowledge of its general geological structure, the age of the various formations which occur in it, and as complete a general idea as possible of their range and extent, so that a foundation might be laid for the detailed work which would follow the preliminary examination; the second idea was, at the same time that the general examination was going on, to work up in detail certain more important districts, so that the public might have light on questions of economical interest, and at the same time be able to form an idea of what the work might be if ever carried to completion. Besides this, the natural history part of the survey was to be carried on, in connection with the geological work, as rapidly as possible, progress in all departments being necessarily proportioned to the varying amounts of the annual appropriations.

California is covered by a vast net-work of mountain ranges, separated by comparatively narrow valleys, with the exception of those of the Sacramento and San Joaquin, which do not, together, cover more than one-fifteenth of the area of the State. The remaining fourteen-fifteenths may be called mountainous, as the valleys include but a small portion of its surface. Into this mountainous region no accurate surveys have ever been carried; even the General Land Office work stops at the base of the mountains. A few ranch lines have been run among the moderately elevated portions of the Coast Ranges; but, as a general thing, the genuine Mexican grants were limited to the plains.

Without considerable topographical work in connection with the geological survey we should, then, be entirely unable to carry on our geological work with any pretense to accuracy, as we could neither locate our observations nor make our descriptions of the country intelligible. The authority for doing something for the increase of the geographical knowledge of the State is found in the clause of the act authorizing the survey, which requires "proper maps" to accompany the reports.

What has been done, up to the present time, in this department may be briefly recapitulated as follows:

A series of maps, forty-nine in number, has been compiled by Mr. Hoffmann from the original documents at the United States Surveyor-General's Office; the scale of these is half an inch to the mile. They contain a compilation of nearly all that is known at that office in regard to the geography of the State. The maps, as thus blocked out, have been used by us in the field, by filling in the topography wherever our route has laid.

The maps which have been or are now being prepared for publication are:

1st. A map of the vicinity of the Bay of San Francisco, on a scale of half an inch to the mile, four feet by three; it extends from near Santa Cruz on the south to Napa on the north, and from the Pacific to Corral Hollow, east and west. The area of land which it covers is 4,248 square miles, which is just twice that of the State of Delaware, and only lacks two hundred square miles of equaling that of Connecticut. As near as can be ascertained, it contains one-third of the population of the State, and has about thirty inhabitants to the square mile—the average density of the population of California being but little over two to the square mile. This map, on which all the details of the topography are given, as minutely as the scale allows, is nearly completed, and will be soon ready for the engraver.

2d. A detailed map, on a scale of two inches to the mile, of the vicinity of Mount Diablo; this is about two and one-half by three feet in dimensions, and includes the most important coal mining district yet known to exist in the State. The map can be made ready for the engraver in a few days.

3d. A map of the Coast Ranges, from the Bay of Monterey south to Santa Barbara. It is about three feet by two and one-half in dimensions, is on a scale of six miles to the inch, and embraces about 16,000 square miles of territory. To complete it will require about another year's work in the field with two sub-parties.

4th. Map of the Washoe silver-mining region—three and one-half by two and one-half feet in dimensions, on a scale of two inches to the mile—and extending over all the important mining ground of the district. This map is from an accurate trigonometrical survey by V. Wackenreuder; it is nearly completed.

5th. Map of the Comstock Lode, on a scale of four hundred feet to the inch, completed.

6th. Map of the central portion of the Sierra Nevada; scale not yet determined on. Extensive surveys have been made by Mr. Wackenreuder for this part of the work, and these will be continued during the present season.

Of the above mentioned maps, Nos. 1 and 2 will accompany the first volume of the Report. Nos. 4, 5, and probably 6, the second volume.

It is intended, if the survey is carried to completion, to construct a final map of the State on a scale of six miles to the inch, in nine sheets, each about three feet square.

In addition to the regular topographical work, an extensive series of barometrical observation has been made, for the determination of altitudes, some two hundred and fifty important points having been ascended and measured. The most interesting operation in this department was the determination of the height of Mount Shasta, which, by an elaborate series of observations, we found to be 14,440 feet above the sea level. This is the first of the lofty volcanic peaks of the Sierra Nevada which has been accurately measured.

In the department of geology proper, our explorations have extended over portions of forty of the forty-six counties into which the State is divided; and when it is remembered that the average size of a county is equal to half that of the State of Massachusetts, (California having just twenty-four times the area of that State,) some idea of the magnitude of our work may be obtained. The chain of the Sierra Nevada may be parallelized with that of the Alps for extent and average elevation; while the Coast Ranges are nearly as extensive as the Appalachian chain of mountains.

We have obtained a pretty clear idea of the general structure of the Coast Ranges from Los Angeles to Clear Lake; the vicinity of the Bay of San Francisco has been worked out in considerable detail, including all of San Francisco, San Mateo, Santa Clara, Alameda, Contra Costa, and Marin Counties, with portions of Santa Cruz, Solano, Napa, and Sonoma. Considerable field-work has been done in the Sierra Nevada, chiefly in the lower portion of the range between Mariposa and Shasta Counties. Our observations have also been extended to the Washoe Region, and we have received considerable collections of fossils from the Humboldt Mining District, (known by this name on the Pacific Coast, but designated on Warren's Map as the "West Humboldt River Range," and in longitude 180°) by which we have been able to fix the age of the formations in that region.

Mr. Gabb has been chiefly occupied, the past year, in figuring and describing the cretaceous fossils of the Coast Ranges and the foot-hills of the Sierra, of which he has nearly two hundred new species ready for publication. He has also described the triassic fossils, collected by the Survey at Washoe, and by Gorham Blake, Esq., in the Humboldt Range. The fossils older than the Trias have been referred to Mr. Meek for investigation. A portion of the fossil plants have been placed in the hands of Dr. J. S. Newberry for description.

It is to the department of General Geology that, up to the present time, by far the greater portion of our attention has been given, since the first thing required in a geological survey is a knowledge of the general geological structure of the State, the age of the various formations which occur in it, and their range and extent, or the position which they occupy on the surface, and their relations to each other. Each group of strata, thus determined by its lithological peculiarities, and by the fossils which it contains, is then to be laid down upon the map, in the position in which its outcrop occupies on the surface. The general character of the minerals and ores which occur in each formation or group of strata having been thus determined, the details of their mode of occurrence, their relative abundance, and the facilities which may exist in each separate district for making them economically available must, after the preliminary general work has been done, be the object of more special and detailed examinations. It is not, however, the business of a geological surveying corps to act, to any considerable extent, as a prospecting party; to do this, would require that we should confine our operations to a very limited area; the labors of the whole corps for an entire season would not suffice to thoroughly prospect more than a few hundred square miles in a very rich mineral region, and we should have often to engage in expensive mining operations to decide what was really of permanent value. It is our task, rather, to limit the field of research, and to show to others where their labors will be best bestowed, preventing foolish expenditures of time and money in searching for what our general geological investigations have determined not to exist in sufficient quantity, in certain formations, to be worth working. Especially in the first years of our work, in a State of such an immense area as California, our labors have more the character of a geological reconnoissance than of a detailed survey.

Already, however, during the progress of our work, a large amount of information has been collected in regard to the mode of occurrence and abundance of the useful ores and minerals of this State and the adjoining Territories. The principal deposits of coal have been carefully examined, and their geological position ascertained. Most of the important quartz mines of the State have been visited by Mr. Ashburner, and a large amount of information has been collected by him, preparatory to an elaborate investigation and report on this important branch of the industry of the Pacific Coast. Considerable work has been done, preliminary to a full report on the geology, mineralogy, and metallurgy of the Washoe region.

In the department of botany and agricultural geology, the work has thus far been chiefly confined to collecting the plants of the State.

Extensive duplicate suites have been preserved both for study and exchange, the specimens now collected amounting to not less than twelve thousand or fifteen thousand in number, and embracing probably half of all the species described from the State, besides many new and undescribed ones. The collections have been made by Professor Brewer while engaged in geological explorations, at a very trifling expenditure of time and money.

In the department of Agriculture proper, less has been done, owing to limited means. Partial preparation was made for investigating the subject of grape culture, and the production of wines; but discontinued from the same cause. Especial attention has been paid to our native forage plants, to aid in devising some means of arresting the rapid decrease of forage in this State, and correspondence entered into to obtain all possible information on this subject from other regions whose climates are similar to our own.

In the zoölogical department—in charge of Dr. J. G. Cooper, who has been employed about half the time since the Survey was commenced—the annexed table gives a succinct idea of what had been accomplished, up to the close of the year 1862, in the way of collecting.

| Class. | Number of species in the collection...... | Of which there are new to California...... | Believed to be new, or undescribed...... | Other California'n species not yet collected...... | Total number credited to California...... | Of which there are found east the Mississippi. |
|---|---|---|---|---|---|---|
| Mammalia ............... | 32 | 10 | 3 | 45 | 77 | 14 |
| Birds ..................... | 170 | 28 | 4(?) | 150 | 320 | 141 |
| Reptiles .................. | 36 | 6 | 3 | 9 | 45 | 0 |
| Fishes .................... | 58 | 16 | 16 | 75 | 133 | 0 |
| Mollusca......... ....... | 335 | 123 | 123 | 65 | 400 | 0(?) |

Of Articulata and Radiata no statistics can be given for want of works especially devoted to the California species.

From this it appears that, notwithstanding the large collections made by Government expeditions and by individuals, during the last ten years, which have been elaborately described in the Pacific Railroad and Mexican Boundary Reports, the Smithsonian publications, and various other works, we have been able to add materially to the known Fauna of California, and of the country at large, even among the highest and best known classes.

Arrangements have been made for having the collections in natural history referred to the highest authorities in each branch, and portions of our materials have already been placed at the disposition of eminent men in Europe and the United States for examination and description.

Deferring the fitting up of a laboratory, and the engaging of a special assistant in the chemical department, until a suitable permanent place could be provided in the State Museum building, Mr. Ashburner went East in the spring of 1862 and commenced the examination of some of the ores and minerals of the State in the laboratory of the Sheffield Scientific School of Yale College, under the direction of Professor Brush, who has charge of the metallurgical department of that institution. The reduction of the appropriation to fifteen thousand (15,000) dollars for the year, made it necessary to suspend this work soon after it was commenced, in order that the whole force of the Survey might be concentrated on the field operations.

A small sum has been allowed to Mr. F. H. Storer, of Boston, for a chemical investigation of the bituminous substances found in different parts of the State. His researches will probably be embodied in the first or second volume of the annual reports. Qualitative examinations, as well as a few quantitative ones, have been made at the office of the Survey, of specimens which have been collected. A considerable number of coals have been analyzed. Information in regard to ores and minerals has been given to a large number of persons who have applied for the same by letter or otherwise, as will always be done when practicable.

If the survey is continued, it will be necessary to fit up a complete laboratory, in which the important questions constantly arising, both in regard to the composition and metallurgic treatment of our ores, may be carefully and systematically investigated.

No provision has yet been made by the Legislature for the arrangement and exhibition of the collections made by the Survey. These are already quite extensive, embracing many thousand specimens of rocks, fossils, minerals, ores, all of which are of importance in illustrating the Natural History, the geological structure and the mineral resources of the State. Such as have not been required for study remain packed in boxes, and are stored at the office of the Survey in Montgomery Block, San Francisco.

Of course it is highly desirable that a permanent, fire-proof building should be provided for the State collections, the proper disposition of which is a subject of great interest, not only as connected with the welfare and progress of the survey, but as influencing the educational and material progress of the State.

The only official step thus far taken in this matter is the appointment, by the last Legislature, of the State Geologist, the State Superintendent of Public Instruction, and the State Surveyor-General as a Board of Commissioners "to report to the Legislature, on or before the second Monday of December, 1863, upon the feasibility of establishing a State University, embracing an Agricultural College, a School of Mines, and a Museum, *including the geological collections of the State.*"

A considerable number of specimens, some of them of value, have been already given to the State by individuals; and there can be no doubt that many interesting and valuable articles would be contributed, provided it were demonstrated that they would be properly exhibited, and well taken care of. It is believed, that when the State Museum is once established, and a suitable building provided, the value and importance of it to the people will soon be made so clear, that it will be sustained and fostered by the Legislature.

By the terms of the Act of the Legislature authorizing a Geological Survey of the State of California, it was made the duty of the State Geologist to present to the Governor, to be laid before the Legislature, as near as may be to the beginning of each session, a "Report of Progress," in which the operations of the Survey during the preceding year should be set forth, and its more important practical results made public. He is also required to communicate an account of the expenditures, and to furnish estimates for the continuance of the Survey.

By an Act of the Legislature of 1862, however, the State Geologist was authorized to combine his first and second annual reports into one volume, to be printed during the winter of 1862 and 1863, and an appropriation of $3,000 was made to pay the expenses of printing, engraving, etc., while the size, form, and style of the report, and the place of printing, were left to the discretion of the State Geologist, under the advice and with the approval of the Governor.

According to this, there is a report now due the State; but, as no part of the appropriation of last year for the continuance of the Survey has been yet received, or is likely to be, for months to come, and as the appropriation for printing is in the same condition, the work has been necessarily delayed. As it is presumed that the amount due the Survey from last year will be available some time next winter, it is not anticipated that there will be any difficulty in issuing the first volume; and, if the Legislature takes the necessary steps early in the session, two, or perhaps three, volumes can be published in 1864. It is intended that they shall be of royal octavo size, in the best style of typography, and illustrated with maps, sections, plates of fossils, etc. The maps will be engraved on copper and printed from transfers, in order the original plates may be preserved, to be used, after necessary corrections and revisions, in the final report, or otherwise, as may be found desirable. The maps will be sold separately, with or without the geological coloring, as desired. The first volume will be chiefly devoted to the geology of the Coast Ranges; the second to that of the Sierra Nevada and the mining districts of the eastern slope. If my plans are not thwarted by the Legislature, both these volumes will be issued together next year, and will form a "Report of a Geological Reconnoissance of the State of California." By the law, as it now stands, the publications of the Survey are required to be copy-righted, and sold for the benefit of the Common School Fund; hence, it has been impossible to communicate to the public, from time to time, through the medium of the Academy's publications, the results which have been obtained. It is proper to say, in this connection, that the extent of territory to be examined, the complexity of the phenomena, and the bearing which our investigations will have on important questions of economical interest, make it eminently proper that there should not be an undue haste exhibited, on the part of the Survey, to place its results before the world. We can only hope to influence the mining public, in this State, by degrees; and it is necessary, first of all, that it should be made clearly to appear, with the lapse of time, that our statements are to be relied on as closely approximating to the truth.

Professor Whitney communicated the following letter from Professor Brush, giving the results of a chemical investigation of the meteoric iron presented to the city of San Francisco, by General Carleton:

SHEFFIELD LABORATORY OF YALE COLLEGE,
NEW HAVEN, March 30th, 1863.

*Professor J. D. Whitney, State Geologist, San Francisco, Cal.*

DEAR SIR:—I have examined the specimen of meteoric iron from Tucson, which you sent me for analysis, and herewith communicate to you my results.

The density of the mass is 7.29. When a fragment of it is placed in a solution of neutral sulphate of copper, it quickly becomes coated with metallic copper, proving the iron to be "active." An inspection of the specimen with a lens showed it to be dotted with little cavities, which on the fresh fracture were lined with a white silicious mineral, giving the surface a porphyritic, or pseudo-porphyritic, appearance.

When a fragment was attacked with an acid, a portion of the iron was dissolved, leaving the silicious mineral projecting from the surface of the specimen; and with a magnifier, black particles of Schreibersite could be seen. After complete solution of the iron, a careful microscopic examination was made of the insoluble residue. With a magnifying power of 25 diameters, it appeared to consist chiefly of two substances: one a milk-white to transparent mineral, having a fused, rounded surface, occurring in little globules, or elongated, rounded particles; while the other constituent was black and angular, and attractable by the magnet. The first named substance, when observed with a magnifying power of 100 diameters, proved to contain minute specks of the black mineral disseminated through it; some of the silicious fragments were translucent and of a milk-white color, and others colorless and transparent; a large number, however, were transparent at one end, shading into milk-white at the other, thus seeming to indicate that the transparent and translucent portions were not two distinct minerals. A blowpipe examination of the silicious mineral showed it to have characters very much resembling *olivine*. The black mineral proved to be *Schreibersite*. A minute trace of chromium was also observed in the insoluble residue.

The qualitative analysis of the portion soluble in nitric acid indicated the presence of iron, nickel, cobalt, copper, phosphorus, lime, and magnesia with unweighable traces of chlorine, sulphur, and alumina. For the quantitative examination of the meteorite a fragment weighing 4.3767 grammes was treated with nitro-chlorohydric acid (aqua regia), and after solution of the iron the whole was evaporated; on approaching dryness, gelatinous silica separated, showing that the silicate had been partially, at least, decomposed by the acid. After heating until the silica was rendered insoluble, it was repeatedly treated with acid and evaporated, so as to insure the oxydation of all the Schreibersite, and finally the soluble part was taken up with chlorohydric acid, and on dilution separated by filtration from the silica and insoluble residue.

The filtrate, or *soluble* part, was accurately measured and divided into four portions for analysis—two portions were used for the determination of the iron, nickel, cobalt, phosphorus, and alkaline earths; a third portion was employed to estimate the copper, and the fourth portion was reserved to answer in case of accident.

Two methods were used for the separation of the iron from the nickel and cobalt—one by precipitation of the iron as basic acetate, and the other by precipitation with carbonate of baryta in the presence of an excess of chloride of ammonium; but in neither case was the separation perfected on the first precipitation, and traces of nickel remained with the iron even after the second precipitation. The nickel and cobalt were separated by means of nitrite of potash. and the cobalt was subsequently converted into sulphate and as such weighed. The lime and magnesia were separated by oxalate of ammonia, care being taken to redissolve and reprecipitate the lime to insure its being free from traces of magnesia. On spectroscopic examination of the precipitate, it proved to be lime, free from other alkaline earths.

The precipitate of iron, after being weighed, was fused with carbonate of soda; the product of the fusion was dissolved in chlorohydric acid, and the phosphoric acid precipitated with molybdate of ammonia. This phospho-molybdic precipitate was dissolved in ammonia to free it from possible traces of silica and other impurities, and the phosphoric acid precipitated from this solution by an ammoniacal mixture of sulphate of magnesia and chloride of ammonium.

The copper was precipitated as sulphide by sulphuretted hydrogen gas, redissolved in nitric acid, and determined as oxyd.

The *insoluble residue*, containing free silica and undecomposed silicate, was perfectly white, and free from all traces of Schreibersite. It weighed 0.1855 grm. equal to 4.24 per cent. of the specimen analyzed. It was fused with carbonate of soda, and the silica and bases determined in the usual manner. It contained 0.159 grm. silica; 0.0054 protoxyd of iron, with a minute trace of alumina; 0.0028 lime, and 0.0168 magnesia.

The soluble and insoluble portions gave in the analysis the following per centage composition:

| | | Considering the silica to exist as olivine. | |
|---|---|---|---|
| Iron | 81.56 | | 79.44 |
| Nickel | 9.17 | | 9.17 |
| Cobalt | 0.44 | | 0.44 |
| Copper | 0.08 | | 0.08 |
| Phosphorus | 0.49 | | 0.49 |
| Silica | 3.63 | Combined with 2.73 Protoxyd of Iron, making Olivine .. | 10.07 |
| Protoxyd of Iron with trace of Alumina | 0.12 | | |
| Lime | 1.16 | | |
| Magnesia | 2.43 | | |
| Chlorine,<br>Sulphur,<br>Chromium. | minute traces | | traces. |
| | 99.08 | | 99.69 |

If the silica found in this analysis be considered to exist in combination with lime, magnesia, and iron, in the proportions to form olivine, it will be necessary to deduct 2.12 per cent. from the amount of metallic iron (equal to 2.73 per cent. of protoxyd of iron), in order to give the silicate the olivine formula, (3 R O, Si $O_3$). Admitting this to be the correct view, the mass analyzed contains 10.07 per cent. of olivine, and by the addition of the oxygen of the protoxyd of iron the analysis adds up 99.69 instead of 99.08.

The variable composition of Schreibersite in different specimens of meteoric iron, and the peculiar character of the insoluble residue of this meteorite, together with the small amount of material in my possession, rendered it impracticable to determine the exact amount of this substance contained in the specimen.

The composition of this meteorite corresponds very closely with another meteoric-iron from Tucson, discovered by Mr. Bartlett, and described by Prof. J. Lawrence Smith, in the *American Journal of Science*, vol. XIX, page 161. Dr. Smith's analysis gives Iron 85.54, Nickel 8.55, Cobalt 0.61, Copper 0.03, Phosphorus 0.12, Chromic-oxyd 0.21, Magnesia 2.04, Silica 3.02, Alumina, trace=100.18. He considers it to correspond to Nickeliferous Iron 93.81, Chrome Iron 0.41, Schreibersite 0.84, Olivine 5.06=100.18. By an evident inadvertence Dr. Smith adds the magnesia and silica together, and gives the sum as olivine; these substances are obviously not in the proportions to form the silicate 3 R O, Si $O_3$, and if we consider the silicate to be olivine, we must reckon the excess of silica as combined with protoxyd of iron. To do this, we must deduct 2.78 from the amount of metallic iron (equal to 2.58 protoxyd of iron), necessary to be combined with the silica and magnesia to give the olivine formula. The amount of olivine contained in the Bartlett meteoric-iron will then be 8.64 per cent. Thus the two masses of iron will be seen to agree very nearly in composition, the only trifling difference being, that Dr. Smith has determined quantitatively the small amount of chromium contained in the Bartlett meteorite, while I have found a little lime and traces of sulphur and chlorine in the specimen you sent to me. The specific gravity I have stated to be 7.39; this was taken on about 12.5 grammes of the iron, and probably is somewhat higher than the portion which I analyzed, as the two surfaces of the larger mass had been rubbed down, and as thus a considerable portion of the exposed silicate would be mechanically removed, it would make the density correspondingly higher.

I regret that I had not more of this interesting meteorite at my command, in order to have determined more definitely and satisfactorily the character of the insoluble residue. I shall be glad to make a further investigation of this point if you will supply me with more material.

Very respectfully yours,
GEO. J. BRUSH.

After reading the above letter, Professor Whitney added some remarks on the form and locality of the meteoric iron analyzed by Professor Brush, stating the circumstances under which it came in possession of the city of San Francisco.

On the twenty-fourth of November, 1862, the Board of Supervisors of this city received, through Mayor Teschemacher, a letter from General George Wright, commanding the Department of the Pacific, stating that he had received a mass of meteoric iron from General Carleton, commanding the "Column from California," and which mass he, in accordance with General Carleton's request, placed at the disposal of the city authorities.

General Carleton's letter is here appended:

HEAD QUARTERS COLUMN FROM CALIFORNIA,
Tucson, Arizona, June 30th, 1862.

To GENERAL GEORGE WRIGHT, *U. S. Army*,
*Commander Dep. of the Pacific, San Francisco, Cal.*

MY DEAR GENERAL:—Soon after my arrival at this place I sent by a train to Fort Yuma, to be shipped to your address at San Francisco, a very large and beautiful AEROLITE, which I found here and which I had heard and read of for many years. In *Bartlett's Explorations*, vol. 2, page 297, it is described as follows: "In the afternoon," July 18th, 1853, "I called to take leave of General Blanco, and at the same time examine a remarkable *meteorite*, which is used for an anvil in a blacksmith's shop. This mass resembles native iron, and weighs about six hundred pounds. Its greatest length is five feet. Its exterior is quite smooth, while the lower part which projects from the larger leg is very jagged and rough. It was found about twenty miles distant on the road towards Tubac and about eight miles from the road."

I desire that you present this aerolite to the City of San Francisco, to be placed upon the PLAZA, there to remain for the inspection of the people and for examination by the youth of the city forever. It will be a durable memento of the march of the *Column from California*.

I am, General, sincerely and respectfully,
Your friend and servant,
JAMES H. CARLETON,
*Brigadier General U. S. A.*

Soon after this mass of meteoric iron came into the possession of the city, I obtained permission from the Board of Supervisors to have sawn from it a small piece for analysis and for distribution to a few of the principal public institutions in this country and Europe having collections of aerolites; this has been done, and also a fine photograph of it taken by Mr. C. E. Watkins, of which copies will be forwarded, with the specimens of the mass itself, as convenient opportunity offers.

The piece intended for analytical examination was sent to Professor Brush of Yale College, and a letter has just been received from him giving the results, which will be found in the preceding pages, and which may appropriately be followed by a few remarks on the size and general appearance of the mass, with such other facts in regard to it as may be of general interest.

The weight of the mass of which the analysis is given above was six hundred and thirty-two pounds, when it arrived in this city, and about two pounds have been since cut from it.

Its shape is irregular, but in general it is that of a flattened elongated slab, having a length of four feet one inch and an average breadth of about eighteen inches; its thickness is irregular, varying from two to five inches. It has evidently been long used as an anvil, having been partly buried in the ground in an upright position, having a flat face of about four inches square on the top, with two holes drilled in the projecting edge for adding to the convenience of its use as a blacksmith's anvil.

The mass is now placed in the Mayor's office, it having been deemed inadvisable to expose it on the Plaza, as desired by the donor, on account of its liability to rust in the damp atmosphere of San Francisco, and the difficulty of securing it from injury by careless or mischievous handling.

Professor Brush remarks that "the composition of this meteorite corresponds very closely with that of *another* meteoric iron from Tucson" discovered by Mr. Bartlett and analyzed by Professor J. Lawrence Smith. A comparison of the analyses of Professors Brush and Smith and a reference to Mr. Bartlett's work seem to render it highly probable, to say the least, that the two analyses were of pieces cut from the same mass.

In this connection I will add to General Carleton's quotation from Mr. Bartlett's book a few lines which complete what is said in regard to the meteorites seen by him at Tucson. Mr. Bartlett adds, after stating that the mass was found about twenty miles distant towards Tubac and about eight miles from the road, "where we were told are many larger masses. The annexed drawing gives the appearance of this singular mass. There is another large mass within the garrison grounds, of which I did not take a sketch. With much labor Dr. Webb broke off a fragment of this meteorite, for the purpose of analysis."

The wood cut which Mr. Bartlett gives of the meteoric iron, which he notices as having been used as an anvil, shows at once, as does also the description, that, contrary to General Carleton's idea, this mass and the one which is now in San Francisco, are not the same. The mass figured by Mr. Bartlett is of a very peculiar shape, well adapting it to use as a common blacksmith's anvil, as it has a broad, flat top, and is supported by two legs.

In the absence of evidence to the contrary, it is reasonable to suppose that the mass forwarded by General Carleton is the one spoken of by Mr. Bartlett as "another larger mass," and of which no drawing was made; while, on the other hand, a piece was taken for analysis. This piece is almost certainly the one analyzed by Dr. Smith, and hence the close agreement in the two analyses—

this chemist, however, not having apparently made so complete a separation of the nickel as Prof. Brush has done. Still it is possible, of course, that different portions of the mass may differ slightly in composition.

Dr. Blake read the following paper:

## Infusoria from the Moving Sands in the Neighborhood of San Francisco.

BY JAMES BLAKE, M.D., F.R.C.S.

The infusoria to which I would call the attention of the Society, were collected from the sands in the neighborhood of Point Lobos. These sands form a moving surface, which in dry weather is drifted by the prevailing winds from the shore of the ocean landwards, and are entirely devoid of any signs of vegetation for some distance from the shore. On walking over these sands when a strong north-west wind was blowing, a wind that does not bring up any fresh sand from the ocean beach at that part of the sand field, I noticed a number of small sized bodies projecting above the surface of the sand as it was being carried onwards by the wind. A closer examination showed that these bodies were formed of particles of sand, agglutinated together by some substance which rendered them almost black, and where dried possessing considerable tenacity. Some of these bodies projected as much as an inch and a half above the surface of the sand, with which however they all remained connected, forming generally small ridges. On examining a portion of this agglutinated sand under the microscope, the water with which I had moistened it was found to be full of infusoria, which commenced moving about as soon as the sand was moistened, although it had been quite dry for some days before being examined. These infusoria probably belong to the genus Monas, but they are so extremely minute that it was impossible to resolve them; they were, in fact, the smallest living infusoria I had ever examined. With a quarter-inch object glass of Powell and Lelands, they appeared as small globular moving bodies, although occasionally a movement would present one of them with apparently a narrow edge. Nothing much more definite could be made out with the microscope of my friend, Dr. Trask, when using an eighth object glass of Smith and Beck, as they could not be resolved into any form sufficiently definite to classify them. They appeared mostly as globular bodies moving about slowly, and presenting sometimes a longer axis, one end being larger than the other, and offering the appearance as if there was a semi-transparent mass attached to the larger end. The size was estimated at from a fifteenth to the twenty-thousandth of an inch. After a careful examination I was unable to detect any vegetable or organic nucleus which might have served as a nidus for these masses of infusoria. They would seem to become developed in the pure sand, or at least in the sand as it was blown up from the beach, after the salt had been washed out of it by the rain. [I would remark that it had been raining some days before I collected them.] Subsequent researches have shown that these infusoria are very generally diffused through the sands that form our drifting sand-hills around the city; and on examining some sand taken at a depth of fourteen feet from the surface, where the hills were being cut through, I found it full of well developed infusoria on placing it under the microscope a few minutes after it had been collected, so that there can be no doubt but that these infusoria were present in the sand at the time it was collected, where they had probably been in a torpid state for ages. It is possible that they might have been carried there by the infiltrating water during the rains; but I am inclined to think that they had been torpid there, as the circumstances in which they were placed were not favorable for propagation except by fission, a process that cannot be carried on indefinitely, even in these lower organisms. In fact, these infusoria, taken from the deep sands, copulated most extensively the moment they were placed in water. I am not aware that analogous observations have been made as to the office of these lower infusoria in fixing the moving sands, and thus initiating that series of changes by which they eventually become clothed with verdure; the first germs of organic life being generally supposed to be established by the lower vegetable organisms.

Dr. Kellogg presented the following paper:

## Description of Two New Species of Plants.

BY A. KELLOGG, M.D.

### CONYZA Less.

*C. salicena* Kellogg. [FIG. 6.]

Stem fruticose, erect, three to four feet in height; branches subglabrous or slightly puberulent, angular; leaves lanceolate, short petiolate, cuneate, base entire, triplinerved, apex acute with few remote teeth on the upper third, lamina fleshy, varnished, subglabrous, minute glands scattering, slightly puberulent chiefly beneath (two to three inches in length, about half an inch in breadth), panicle subcorymbose; heads pedicillate, mostly subtended by linear nerved bracts; involucral scales ovate-oblong, sub-acute, scarious, margins irregularly cut-toothed or somewhat erose, cut-ciliate; achenia pubescent; pappus equal, white, scabrous; florets, teeth villous on the tips and back, tube short; anthers not caudate; receptacle convex, naked, punctate.

This plant is closely allied to the South American *C. triplinerva*, but differs in the shrubby character of the stem—the leaves also are not "ovate-lanceolate," but lanceolate, and somewhat glandular, and like the branches puberulent—the heads are subtended by bracts, the involucral scales are not "linear lanceolate," but ovate-oblong and sub-acute, etc. The white pappus is not short, but equal if not longer than the florets—the achenia are not "glabrous," etc. Found at Clayton, Contra Costa County.

### COLLINSIA Nutt.

*C. divaricata* Kellogg. [FIG. 7.]

Stem erect, divaricately branching, one to three inches high, pubescent, interspersed with a few short glandular hairs. Cotyledons oval or oblong obtuse, entire, petioles as long as the lamina; middle cauline leaves on shorter petioles, ciliate at the base or subsessile, ovate or oblong sub-acute, entire at the base, coarsely

FIG. 6.

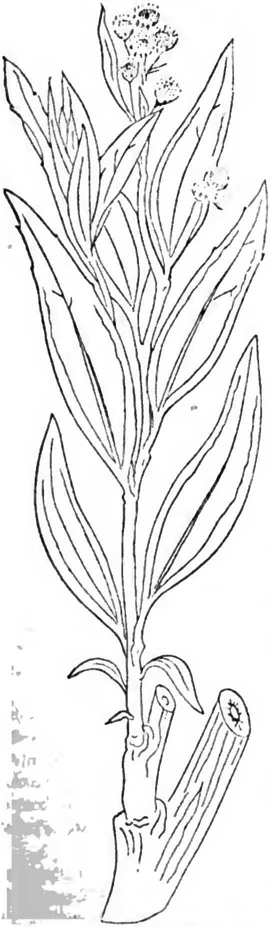
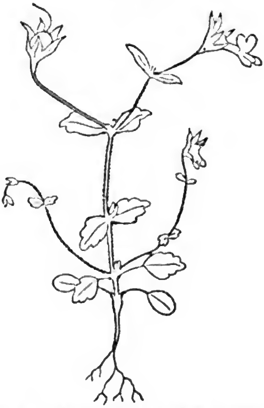


FIG. 7.



three to five-toothed, nerves obsolete, all pubescent above, glabrous below; superior pairs, sessile, lanceolate, acute, entire.

Flowers small, axillary, and solitary on long divaricate ascending peduncles, articulated at the base by a swelled joint, purplish pink alike throughout, twice the length of the calyx, upper lobes broadest, margins crenulate, saccate base of the tube much compressed above, glabrous within, throat constricted, the external expansion purple spotted above, filaments hirsute, stigma minutely bilobed. The obconical expanding calyx narrowed and slightly depressed above at the base, and correspondingly swelled below, segments ovate acute, fleshy, glabrous; margins minutely ciliate, somewhat unequal, or three larger and two smaller; capsule globose, pink and purple spotted above, seeded. Flowering in March and April.

This very minute species—often barely an inch or more in height—had hitherto escaped our observation, until little friend George Bloomer discovered it, while on a trip with us to the hills in this vicinity. The whole plant at length often assumes a scarlet or purplish hue. It certainly is not the *C. violacea* of D. C. and appears quite as distinct as any species known to us.

Mr. Bolander made some remarks on the peculiar growth of *Carex decidua*, in Marin County, not on the borders of the creeks, but in the middle of them. He also spoke of *Hierochloa fragrans* R. S., as a remarkably fragrant plant, and as furnishing beautiful grass for lawns.

## REGULAR MEETING, MAY 18th, 1863.

President in the Chair.

Nine members present.

Messrs. W. S. Sullivant, and Leo Lesquereux, of Columbus, Ohio, were elected Corresponding Members, and Rev. T. Starr King a Resident Member.

Donations to the Cabinet were received as follows:

Specimens of copper ore from the Mammoth Lode, Del Norte County, by Dr. Trask.

## REGULAR MEETING, JUNE 1st, 1863.

President in the Chair.

Ten members present, and Dr. Hillebrand, of Honolulu, by invitation.

Dr. Kellogg presented the following paper:

### Description of a New Species of Hosackia.

BY A. KELLOGG, M.D.

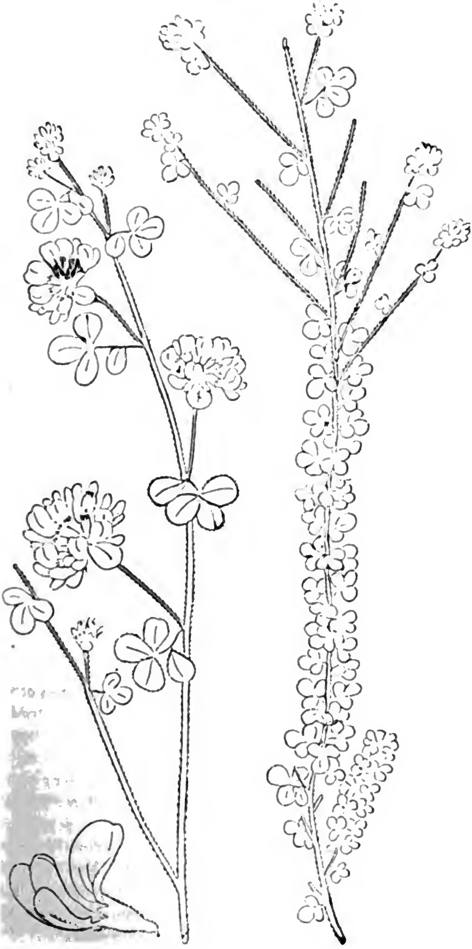
HOSACKIA Dougl.

*H. argentea* Kellogg. [FIG. 8.]

Appressed satiny pubescent throughout, prostrate, much branching from a perennial crown.

Leaves short, very densely set or crowded along the lower stem, leaflets three, very small, rounded, and scarcely mucronate; the upper leaves larger, leaflets four (only one of the lower pair developed), obovate obtuse, very abruptly mucronate-acute; stipules red, minute and gland-like, glabrous. Peduncles twice the length of the leaves; umbels six to ten-flowered, bract of a single sessile obovate leaf (a few separate pink glands or embryoid stipules often present).

Fig. 8.



Flowers orange yellow throughout; keel obtuse, wings and banner equal; teeth of the calyx about one-third its length, acuminate, embryo legume terete, appressed pubescent, two-seeded; mature fruit unknown.

From Kern River, pendent from rocky cliffs. The Society is indebted to Mrs. Hutchings for this new and very beautiful species.

Dr. Ayres presented a paper by Dr. T. M. Logan, of Sacramento, on the Physics, Hygiene, and Thermology of the Sacramento River, which was read and referred to the Publishing Committee.

---

## Regular Meeting, June 15th, 1863.

Dr. Ayres in the Chair.

Six members present.

Donations to the Cabinet:

Insects from seeds imported from Germany, by Mr. Bevans; plants from Sonoma, by Dr. Behr.

Donations to the Library:

Annual Report of the Trustees of the Museum of Comparative Zoology for 1862. American Journal of Science for May, 1863, from the Editor.

Dr. Kellogg read the following paper:

### Description of a New Species of Mentzelia.

BY A. KELLOGG, M.D.

MENTZELIA L.

*M. pectinata* Kellogg. [FIG. 9.]

Rough, with a white minutely-barbed pubescence throughout; stem four to six inches high; simple, or slightly branched at the summit; greenish, or a little blanched at the base; leaves pinnatifid, lower petiolate, the upper sessile, three-nerved; flowers of a shining golden color, with a lustrous metallic hue, shading from a deep, vivid orange to a burnt carmine center; stamens very numerous, all filiform, scarcely half the length of the petals; anthers white; style longer, spirally twisted above at the divisible portion; petals five, spreading, obcordate or obovate cuneate at the base. Flowers from three-fourths to one inch in diameter, clustered at the summit by the short branches; short pedicillate (the uppermost often sessile or sub-sessile); two or three linear-subulate bracts above the pedicel at the base of the capsule; capsule thickened upwards from a sharp base; calyx segments lance-subulate acute.

Root ligneous.

Found by Mrs. Hutchings on the mountains above Visalia.

FIG. 9.

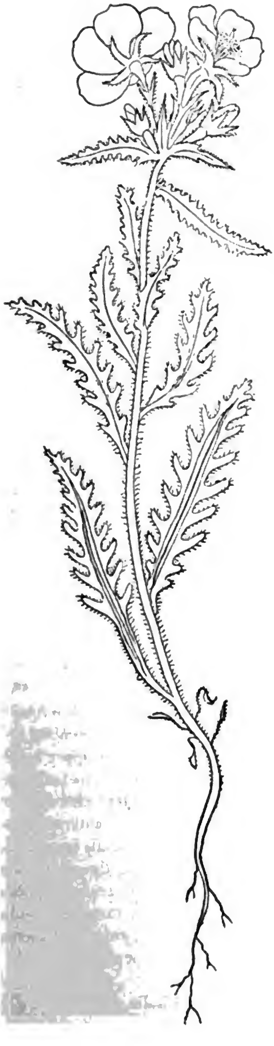
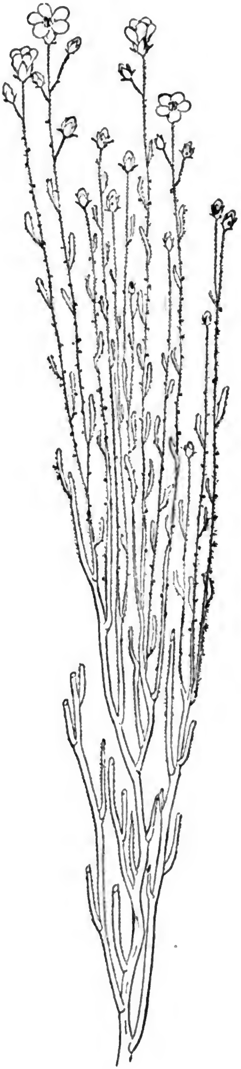


FIG. 10.



## Regular Meeting, July 6th, 1863.

President in the Chair.

Twelve members present.

Professor George Thurber, of New York City, and F. W. Putnam, Esq., of Cambridge, Mass., were elected Corresponding Members.

Donations to the Library were received as follows:

Proceedings of the Academy of Natural Sciences of Philadelphia for October–December, 1862. Transactions of the Academy of Science of St. Louis, Vol. II, No. 1. Bulletin of the Museum of Comparative Zoology at Cambridge, Mass. Proceedings of the Boston Society of Natural History, Vol. IX, Signatures 11 and 12.

Dr. Kellogg read the following paper:

### Description of Three New Plants.

BY A. KELLOGG, M.D.

#### Linum L.

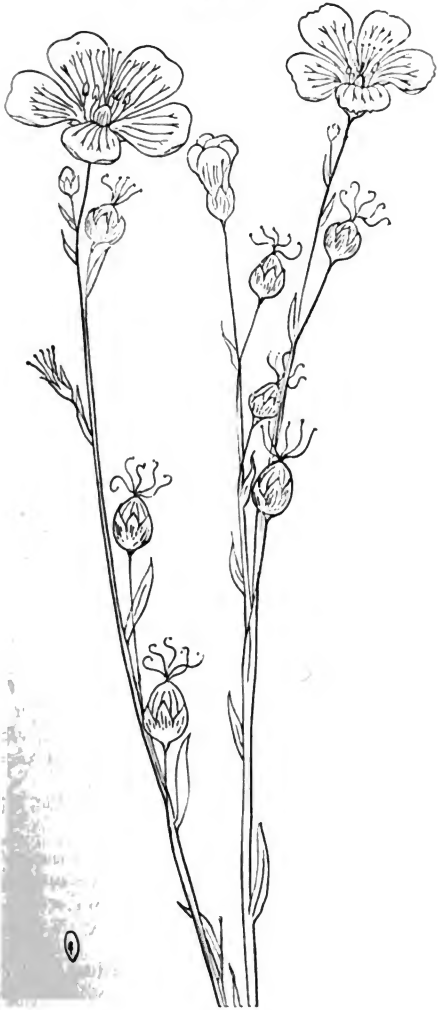
*L. trisepalum* Kellogg. [Fig. 10.]

Stem suffruticose; base flexuous, smooth, cinnamon brown, numerously branched above; branches green, slender, erect, subsimple, stellate pubescent from minute scabrous elevations, and also simply short pubescent; plant sub-triangular throughout. Leaves erect, sub-appressed, small, linear, obtuse, slightly narrowed at the base into a very short petiole, alternate. Flowers small, yellow, in sub-terminal racemoid panicles; pedicels as long, or twice the length of the flowers; calyx bi-bracteate (appendaged ?); bracts minute (about half the length of the sepals), linear, foliaceous (rudimentary sepals); proper sepals three, nerveless, ovate, acute (or sub-acute), imbricated margins glabrous, as long as the capsule. Petals obovate, sub-cuneate, scarcely twice the length of the sepals; stamens ten (yellow), shorter than the calyx; styles one, short; stigmas three, or united the entire length; capsule spheroid obtuse, sub-triangular, three-valved, each valve two-seeded, false dissepiment incomplete.

A small shrubby species, six inches to in height, found by Mr. Bolander on the White Hills back of Oakland.

P. S.—From the ripe fruit since obtained, the capsule is more ovate; separating invariably into three valves, only two to three ovules attaining to maturity; the seeds black, sub-compressed ovate, plano-convex or with two plain sides, the third convex, surface rough.

Fig. 11.



### *L. decurrens* Kellogg. [Fig. 11.]

Stem annual, smooth, somewhat erect, sparingly branched, four to six inches of their summits racemed (the simple branches but slightly diverging from a vertical direction) much decurrent, from one to two feet in height. Leaves alternate, narrowly lanceolate, one-nerved, sharply acuminate (the lower-most leaves unknown). Flowers secund, large purplish blue, unilateral on long much decurrent pedicels, expansion of the pedicel above the articulation at the base of the calyx quadrangular; sepals five, ovate-oblong acute, margins scarious, seven-nerved, rather more than half the length of the capsule. Petals obovate, cuneate, claw short emarginate or crenate at the apex, marked by about five deeper blue veins. Styles five, free to the base, stigmas capitate. Stamens five, short; anthers oblong, white. Capsule ovate, very abruptly short pointed, completely ten-celled. Seeds oblong, hilum slightly narrowed.

Found by Mrs. Thayer on the head waters of Feather River.

## Silene L.

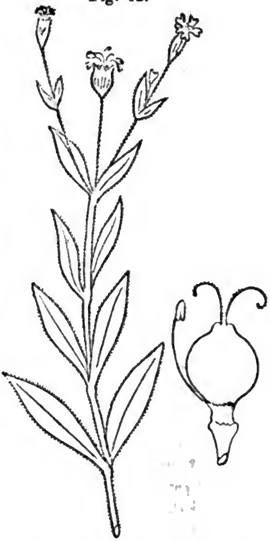
### *S. Dorrii* Kellogg. [Fig. 12.]

Stem simple or dichotomous above, minutely velvety glandular pubescent throughout, upper and cauline leaves lanceolate, acute or acuminate, sessile or sub-sessile, opposite, erect, slightly cilliate at base (radical leaves unknown). Flowers white, very small, sub-solitary on long peduncles; calyx tubular-campanulate, at length inflated, teeth short, acute (tipped with purple), tube ten-nerved; petals not crowned, minute border sub-two-lobed, lamina expanded, claws long and very slender; stamens ten, longer, at length shorter, filaments glabrous, anthers sagittate; styles two to three, separate, recoiled; stigmatose along the entire inner face. Ovary somewhat globose, apex slightly contracted; compressed seeds granular, stipe of the capsule very short.

A plant about three to five inches in height.

Collected by Mr. Herbert C. Dorr in Nevada Territory.

Fig. 12.



Dr. James Blake read a paper on the gradual elevation of the land in the environs of San Francisco.

# On the Gradual Elevation of the Land in the Environs of San Francisco.

BY JAMES BLAKE, M.D., F.R.C.S.

The gradual elevation and depression of large portions of the earth's surface has, within the last few years, been attracting considerable attention from geologists. It is a vast geological process of which we are the actual spectators, offering us the most imposing terrestrial phenomenon of which we can be cognizant, and at the same time affording us some tangible idea of the vast periods that have been required for bringing the surface of the earth to its present shape. It is the general opinion of geologists that the western shore of our continent is gradually rising. This has been proved to be the case as regards the southern portion of the continent; but the following facts, observed in the neighborhood of this city, afford undoubted evidence that at least this portion of the northern continent is being gradually elevated above the level of the ocean.

On the northern bank of Lobos Creek, a small stream running from Mountain Lake to the ocean, muscle shells and rolled pebbles are found at an elevation of from eighty to one hundred feet above the present level of the ocean. and probably at the distance of half a mile from the present beach. These shells and pebbles are exactly analogous to those now being deposited at the mouth of the creek, and were undoubtedly placed there when the spots at which they are found formed the beach of the ocean. The surface of the country is so much covered by drifting sands, that it is only in spots that these shore remains show themselves. The deposits first seen contain remains of shells considerably weathered—lower down the creek, shells and larger pebbles are seen; still lower down I found the same materials mixed with smaller pebbles, and at an elevation of about fifty feet small bands of black peat earth were found interstratified with the sand and gravel. These small bands of vegetable earth were evidently formed near the level of the ocean by the waves throwing up a barrier of sand which dammed up the waters of the creek, so as to form a pond in which a layer of vegetable matter was deposited. This process is going on at the present time, a dam having been thrown up by the heavy storms of the winter of 1861-1862.

Another evidence of the recent elevation of the country is seen near the western end of the Puerta Suelo, at a distance of about eight miles from the city. Here there is a depression in the hills, extending from the bay to the ocean, and forming a narrow neck to the peninsula on which San Francisco stands. Even at present, the distance from the waters of the bay to the ocean is not more than two or three miles at this point, and it is evident that at no very distant period this depression formed a channel of communication between them. Near the western end of this former channel, and at about a mile inland from the present sea beach, the skeleton of the head of a whale is found on the surface of the ground. The specimen measures about six feet across, and must have belonged to an animal fifty or sixty feet long. The bones, which are not at all mineralised, are in a good state of preservation. At the time they were carried there, there must have been eight or ten feet of water over the surface, and as the place is at present from ten to fifteen feet above the level of the ocean, a rise of twenty-five or thirty feet must have taken place at this spot since the animal was washed there.

Another locality at which evidence of the gradual elevation of the land can be obtained is found to the west of Black Point, where abundant remains of our present bay shells are found at a considerable elevation above the level of the sea; and, were not the surface of the country, particularly the lower levels, so completely covered in by the drifting sands, no doubt many analogous deposits could be found. To the south and west of the Mission, and in all the lower levels between there and the range of hills overlooking the Puerta Suelo, the surface is covered by these recent post tertiary deposits, through which the older rocks protrude in many places as isolated masses, the recent argillaceous sandstone being deposited in nearly horizontal strata around their base. These sandstones have given rise, by their decomposition, to the extensive surfaces of yellow sandy loam seen between the Mission and the Ocean House. I think the highest of these beds does not attain a greater elevation than one hundred feet above the present level of the ocean.

More recent evidence of the gradual elevation of the land is furnished by the holes made by the marine worms in the rocks on the shores of the bay, many of these holes being found at elevations which the highest tides do not at present reach.

On the age of these deposits it is useless at present to speculate. All that we know for certain is, that geologically speaking, they are recent; but whether it is five hundred, or five thousand, or fifty thousand years since the present site of Mountain Lake was on a level with the ocean, our present data do not enable us to form an opinion. All that the facts prove is that this portion of the continent is being gradually raised *en masse.*

From observations I have made on the main range of the Sierra, I am inclined to think that this process of gradual elevation is not confined to the land bordering the sea coast, but extends far into the interior. The undisturbed position of the post tertiary strata on the western slope of the Sierra, would indicate that the same process of gradual elevation must have been going on for hundreds of thousands of years, so that the original beach of the earlier post tertiary ocean is now at an elevation of four or five thousand feet above the present level of the sea. Should subsequent observations confirm the truth of this supposition, this country would afford a more striking example of the action of existing causes in modifying the surface of the earth, than is to be found in any other portion of the globe. It is desirable that some means should be taken to ascertain and record accurately the present relative level of the sea and land, as, after a few years, such a determination might furnish some very useful geological data. I have no doubt that it will be found that every shock of an earthquake is accompanied by an elevation of the land.

San Francisco, July 6th, 1863.

## Regular Meeting, July 20th, 1863.

Dr. Ayres in the Chair.

Twelve members present.

J. B. Bayerque, Esq., was elected a Life Member.

Donation to the Cabinet: A number of birds and quadrupeds were deposited by Mr. W. W. Holder.

Donations to the Library:

Ascent of Pike's Peak by Dr. C. C. Parry. Biennial Report of the Chicago Historical Society to the Governor of Illinois.

The Corresponding Secretary read a letter from Samuel H. Scudder, Esq., to Dr. Behr, from which the following extracts are taken:

"Through the kindness of Mr. Edwards, I have had the opportunity of looking at your two recent papers on *Argynnides* and on *Danais*, and have been much interested therein. Reading the latter article, I instantly had recalled to me some statements in regard to localization of the species at the Sandwich Islands by the sons of one or two American missionaries long resident there—gentlemen in every way to be depended on for common accuracy—by those statements I was led to an opposite conclusion from yours in regard to the means by which it was introduced; and since I have read your paper I have met with Dr. Gulick, for some time a missionary at Ascension Island, one of the Micronesian group, now in America for his health, from whom I have received some additional facts. They all concur in stating that this butterfly was formerly wanting at the Sandwich Islands, and spread over the Islands just as fast as did the milk-weed upon which they feed—the two keeping pace with one another. Dr. Gulick makes some more definite statements; he says that a gentleman in Hawaii sent him on Ascension Island (2,000 or 3,000 miles distant) a large box of plants under glass; that when they reached Ascension Island he found among them the milk-weed, which was set out with others; in five or six weeks they reached maturity, and then they discovered upon them the larvæ of *Danais* which nearly destroyed them—the natives have never before seen them and the butterfly was altogether unknown, indeed, no such large and showy butterfly exists there. Subsequently and purposely, as an experiment, he took some seeds to the opposite side of the Island, twenty-five miles distant, and sowed them, and was absent some four or five months; when he returned the larvæ were there. A gentleman and the natives had been put upon the watch by him for the butterflies but none had been seen, and these larvæ changing produced the first they had any of them seen.

"It seems to me that the appearance of the larvæ on the transported plant in its early growth leaves but little room to doubt that the eggs of the insect were transported also in the Wardian case."

Prof. Whitney read the following notice of the large mass of meteoric iron now in this city, on its way to the Smithsonian Institution:

By a singular coincidence, we have now the pleasure of seeing in this city the two great masses of meteoric iron which have been so often spoken of as being at Tucson, in Arizona, one of which was brought here and presented to the city by General Carleton, in November last, a notice of which, with an analysis, has already appeared in our proceedings. This mass may properly be designated as the "Carleton (Tucson) Meteoric Iron," while the one which is destined for the Smithsonian Institution may be called the "Ainsa (Tucson) Meteoric Iron," as it has been rendered accessible for scientific investigation by Mr. Jesus M. Ainsa, as will be seen by the following memorandum of the circumstance kindly furnished by his brother, Mr. James M. Ainsa:

"This ærolite was first discovered by the early Jesuit Missionaries in the mountains called the 'Sierra de la Madera,' near Tucson.

"In 1735, El Capitan de las Provincias del Occidente, Don Juan Bautista Anza, induced by the accounts of the science-loving Jesuits, ordered the aerolite to be removed from the mountains, with the intention of sending it to Spain. However, through the want of wagon roads and the proper means of conveyance at that time, to take it to San Blas, then the nearest port of entry, the attempt was entirely abandoned.

"The aerolite was left at Tucson, where it continued to attract the attention of the scientific men who visited that country for more than a hundred years. Since the acquisition of Arizona by the United States, greater notice has been taken of this aerolite, it having been mentioned several times in the official reports of the Government agents.

"By a singular coincidence, Augustin Ainsa, the great-grandson of Don Juan Bautista Anza, undertook, in 1860, to transport the aerolite and present it to the Smithsonian Institution. With great difficulty it was brought as far as the Yñigo hacienda, where it remained until May, 1863, when Jesus M. Ainsa, in his late visit to Sonora, brought it to this city, with the intention of forwarding it to the Smithsonian Institution at Washington, where it will soon be sent."

At present the mass in question lies upon the steps of the Custom House, where it has been most admirably photographed by Mr. Watkins.*

It was said by Mr. Ainsa to weigh 1,600 pounds.

The shape of this meteoric mass is very peculiar; and, at first, it would hardly be recognized as the identical specimen figured by Mr. Bartlett at Tucson, especially as this gentleman estimated its weight at 600 pounds only. Instead of being, as Mr. Bartlett supposed, a mass supported on two legs, it is, in reality, a ring of metal, of very irregular dimensions, of which about one-quarter was buried in the ground, in order to support it in a convenient position for use as an anvil, when it was seen by him at Tucson.

---

*The mass was shipped on the Panama steamer, which sailed from San Francisco on the 3d of August.

The dimensions of this ring are as follows:

| | | |
|---|---|---|
| Greatest exterior diameter | 49 | inches. |
| Least exterior diameter | 38 | " |
| Greatest width of central opening | 26½ | " |
| Least width of central opening | 23 | " |
| Greatest thickness at right angles to plane of ring | 10 | " |
| Width of thickest part of the ring | 17½ | " |
| Width of narrowest part | 2¾ | " |

The weight of the mass corresponds, taking the specific gravity at 7.2, with a circle-ring, having an average width of one foot, and a thickness of a small fraction less than eight inches—the diameter of the circle represented by the exterior of the ring being assumed as four feet.

On examining with a magnifying glass a fractured surface of the mass, it was seen at once to be different in composition from the Carleton Meteoric Iron, and my conjecture that Prof. Smith was mistaken in supposing that he analyzed a fragment from the mass figured by Mr. Bartlett, was confirmed.* It is now almost certain that Messrs. Brush and Smith did analyze fragments of the same meteoric iron.

The Ainsa Meteoric Iron contains a large per centage of a white—almost transparent—silicious mineral, having a vitreous lustre, which may be olivine; but the amount seems larger than that in the Carleton mass. The Smithsonian Institution will undoubtedly cause a chemical investigation to be made of this superb meteoric mass, and it will be interesting to compare its composition with that of the Carleton meteorite, as the two were found so near each other that they may be supposed to have formed portions of the same body, and to have fallen at the same time.

The photograph was taken by Mr. Watkins, at my request, partly to be sent abroad as a specimen of the high degree of perfection which has been attained by this gentleman in this department of art, and partly that an exact representation might be secured of this very remarkable body, in case it should be lost or captured on its way to Washington.

In concluding this notice, the following statement is given of all that is known of the size and position of the masses of meteoric iron which have been noticed by various travelers in Arizona and the adjacent portions of Mexico and New Mexico.

*In the Madera range,* "Sierra de la Madera," between Tucson and Tubac, "enormous masses of pure iron, some of which were transported to Tucson, and for many years were to be seen in the Plaza of that Presidio." Francisco Velasco, in W. F. Nye's Translation of his work on Sonora, p. 146, published at San Francisco in 1861.—Two of these masses have been brought to this city, the one weighing 1,600, the other 632 pounds; the question arises, how many more are left in the Sierra Madera? To this, no answer can be given at present.

---

* See page 34, of this volume.

"At the *Hacienda de Concepcion*, on the road from Chihuahua to Rio Florida," a mass of meteoric iron estimated to weigh 3,853 lbs.—Bartlett. The exact locality of this hacienda I have not been able to ascertain.

"*Ninety miles north-west of Santa Rosa*," supposed to be the Santa Rosa in the province of Coahuila, in Mexico, lat. 28°, long. 101° 30′; Ass't A. Schott, of the Mexican Boundary Survey, reports a large number of masses of meteoric iron; see page 34, Part II, of Major Emory's Report. This statement needs confirmation.

"*Sancha Estate, some fifty or sixty miles from Santa Rosa, in the north of Coahuila.*" This is the locality of the mass of meteoric iron, weighing 252 pounds, and now in the collection of the Smithsonian Institution, figured, described and analyzed by Professor Smith; see Smithsonian Report for 1855, p. 154, and Silliman's Journal, (2) XIX, 160. Professor Smith says, "various accounts were given of the precise locality, but none seemed very satisfactory." It is not unlikely that this mass is from the same locality mentioned by Mr. Schott.

"*Near the South-western edge of the Balson de Mapimi, on the route to the Mines of Parral*, there is a meteorite, near the road, of not less than a ton weight;" on the authority of Mr. Weidner, of the mines of Freiberg, as stated by Professor Smith (Smithsonian Report for 1855, page 155), Mapimi is in lon. 103° 30′; lat. 25° 45′ nearly.

"*At the Hacienda of Venagas*, there was (1827) a piece of iron that would make a cylinder, one yard in length, with a diameter of ten inches." It was said to have been brought from the mountains near the Hacienda." Professor Smith, on the authority of Dr. Berlandier (Smithsonian Report for 1855, p. 155), makes the above statement; the exact locality of the Hacienda I have been unable to ascertain; it is probably nearly in lat. 24°, lon. 101°.

*La Paz, New Mexico*, near the Colorado River, about lat. 33° 30′. A mass of meteoric iron, weighing 10 pounds, was brought from that locality, in 1862, by Mr. H. Ehrenberg.

A number of other localities of meteoric iron might be added from more southern and central portions of Mexico; but as that is a region to which the attention of Californian explorers and capitalists has not yet been much directed, it will not be necessary to cite them here. It is hoped that the circulation of the above list may be the means of procuring further information in regard to the masses of iron noticed; and that, possibly, more of them may be brought to San Francisco.

---

## REGULAR MEETING, AUGUST 3d, 1863.

President in the Chair.

Present, eleven members.

F. M. Spence, of Victoria, V. I., was elected a Corresponding Member.

Donations to the Cabinet:

Two species of grasses collected in Mariposa County, by Mr. Rowlandson.

Donations to the Library:

The following foreign journals and scientific works were received through the Smithsonian Institution:

Proceedings of the Royal Horticultural Society, Vol. i, Nos. 6 and 7 (1859), 8–19 (1860), 20–31 (1861), Vol. ii, Nos. 1–12 (1862); List of the Fellows for 1861 and 1862; Der Zoologische Garten, Nos. 1–12, 1862; Bulletins de l'Academie Royale de Belgique, Tomes ix–xii, 1860, 1861; Memoires de l'Academie de Dijon (2) ix, x, 1861; Annuaire de l'Academie Royale de Belgique, Anneés 27 et 28; Memoires de la Société Imperiale de Sciences Naturelles de Cherbourg, Tome viii, 1861; Sitzungsberichte der k. bayr. Akademie der Wissenschaften zu München, 1861, ii, Heft 1–3, 1862, i, Heft 1–4 1862, ii, 1; Abhandlungen der Math. Physik. Classe der k. bayr. Akademie der Wissenschaften, Band ix, Abtheilung 2, München, 1862; Annalen der Königl. Sternwarte bei München, Band xi, 1862; Nachträge zu Maly's Enumeratio plantarum phanerogamicarum imperii Austriaci universi, von Aug. Neilreich, Wien 1861; Verhandlungen der k. k. zool.-bot. Gesellschaft in Wien, 1861, Bd xi; Jahrbuch der k. k. geolog. Reichsanstalt 1861 and 1862, Band xii; Untersuchungen über die Dichten und Brechungs-exponente, von Dr. Ad. Weiss und Ed. Weiss; Geognostische Beschreibung der preuss. Oberlausitz, von E. F. Glocker, Görlitz, 1857; Abhandlungen der Naturforschenden Gesellschaft zu Görlitz, Band ii, 1860; Mémoires de l'Academie imperiale de St. Petersburg, Tome iii, No. 12, iv, Nos. 1–9; Schriften der k. phys.-ökon. Gesellchaft zu Königsberg, Jahrgang 1, Heft 2 (1861), ii, 2, 1862; Die Culturpflanzen Norwegens, von Dr. P. C. Schübler, Christiana, 1862; Meteorologische Beobachtungen des Observatoriums zu Christiana i and ii, 1862; Beskrivelse over Lophogaster typicus, von Dr. M. Sars, Christiana, 1862; Geologiske undersögelser af Dr. Theodor Kierulf, Christiana, 1862; Zwei Karten zur geognostischen Beschreibung der preuss. Oberlausitz, von E. P. Glocker; Mittheilungen der Naturf. Gesellschaft in Bern, 1858, Nos. 408–423, 1859, 424–439, 1860, 440–468; Verhandlungen der Schweizerischen Naturf. Gesellschaft, 43te Versammlung, Bern, 1859; Correspondenzblatt des Naturf. Vereins zu Riga, 12ter Iahrgang, 1862; Bericht über die Thätigkeit der St. Gallischen Naturwissens. Gesellschaft, 1858–1860; Atti della Società elvetica delle Scienze Naturali riunita in Lugano, 1860, 44th Session; Verhandelingen van het Bataviaasch Genootschap, Part xxvii, 1860, xxviii, 1860; Tijdschrift voor indische Taal-Land-en Volkenkunde, Deel vi, 2–7, vii, 1–6, viii, 1–6, ix, 1–6, x, 1–6 (1860); Studien aux der Natur, von Dr. Ad. Weiss und J. G. Weiss; Fluorescenz der Farbenstoffe, von Dr. Ad. Weiss.

Mr. Gabb presented the following paper by Mr. Rémond:

## Description of Four New Species of Echinodermata, from the Tertiaries of Contra Costa County.

BY AUGUSTE REMOND.

### ASTRODAPSIS Conrad.

#### *A. Whitneyi* Rémond.

Disk circular, or sub-pentagonal, slightly notched at the extremity of the ambulacra.

Apex central and elevated; edge depressed.

Ambulacral star symmetrical, prominent near the apex; petals equal, reaching to the margin of the disk.

Interambulacral spaces much depressed near the edge.

Lower surface slightly and gradually concave; furrows well marked and straight.

Mouth central, circular; anal aperture small, sub-marginal.

Papillary tubercles somewhat remote, smaller above than beneath, situated in wide and shallow cells; miliary tubercles very numerous and crowded, both on the superior and inferior surfaces.

| | |
|---|---|
| Greatest diameter | 1.8 inches |
| Smallest diameter | 1.65 " |
| Height | 0.3 " |

Locality: Kirker's Pass formations. Found in lower pliocene beds.

The genus astrodapsis, to which I have referred the above species, was indicated by Mr. Conrad, in the Pacific Railroad Reports, Vol. VII, Palæontological Report, page 196, without any generic description.

The genus is closely allied to clypeaster, but differs from it in having the petals of the ambulacral star extending to the edge of the disk, opened at the extremity, and in the margin of the disk being slightly notched at the extremity of each petal. The inter-ambulacral spaces are depressed. On the under surface there is a deep groove corresponding to each petal.

My collection, and that of the State Geological Survey.

#### *A. tumidus* Rémond.

Disk rounded sub-pentagonal, thick, rounded on the edge, very slightly notched at the end of the ambulacral areas.

Apex small, central, depressed.

Ambulacral petals symmetrical, very prominent, reaching to the margin, longitudinally grooved by a median line. The outer pores of the petals abruptly depressed on each side.

Inferior surface slightly concave.

Mouth central, small, rounded.

Ambulacral furrows straight, well marked.

Anus small, sub-marginal.

Papillary tubercles numerous, especially in the ambulacral areas, and in the center beneath, not prominent, situated in comparatively deep and sub-angular cavities.

| | | |
|---|---|---|
| Greatest diameter | 1.34 | inches. |
| Shortest diameter | 1.26 | " |
| Height | 0.34 | " |

Locality: Kirker's Pass formations; occurs as the preceding species; also two miles west of Walnut Creek House.

From the collections of the California Academy of Natural Sciences, of the State Geological Survey, and my own.

### ECHINARACHNIUS van Phels.

### *E. Brewerianus* Rém.

Disk small, oval-elongated, broader behind, rather thin.

Upper surface slightly convex; margin rounded.

Apex posteriorly sub-central.

Petals close, nearly symmetrical, the anterior and posterior ones the longest, as wide as or even wider than the inter-ambulacral spaces; ambulacral areas composed of very narrow plates, widening on the margin.

Inferior surface plane.

Ambulacral furrows not visible in the specimens examined.

Mouth small, central.

Anus very small, sub-marginal.

Papillary tubercles numerous, rounded, somewhat prominent, more crowded beneath than above.

| | | |
|---|---|---|
| Length | 1.22 | inches |
| Width | 1.06 | " |
| Height | 0.30 | " |

Locality: Two miles east of Walnut Creek House; from miocene beds.

Collection of the State Geological Survey, and mine.

This species is dedicated to Prof. W. H. Brewer, Botanist to the Survey.

### CLYPEASTER Lamark.

### *C. Gabbii* Rém.

Disk rather small, comparatively thick, varying from circular to sub-pentagonal and irregular sub-oval.

Apex nearly central, sub-elevated; margin rounded; genital apparatus sub-angular.

Ambulacral star almost symmetrical; petals about equal in length, elongated, open at their extremities.

Inferior surface flat near the edge, and gently concave in the center.

Mouth depressed, sub-central.

Ambulacral furrows straight, slightly marked.

Anal aperture very small, marginal.

Tubercles of the upper surface numerous, especially in the ambulacra, round and prominent.

| | |
|---|---|
| Greatest diameter | 1.16 inches. |
| Smallest diameter | 1.10 " |
| Height | 0.28 " |

Locality: The C. Gabbii occurs abundantly on the eastern shore of San Pablo Bay, south of Mare Island, in soft sand-stones of miocene age.

Collections of the State Geological Survey, and Academy of Natural Sciences; also Mr. Gabb's, Mr. F. L. A. Pioche's, and mine.

Dr. Kellogg read the following paper:

## Description of a New Species of Allium.

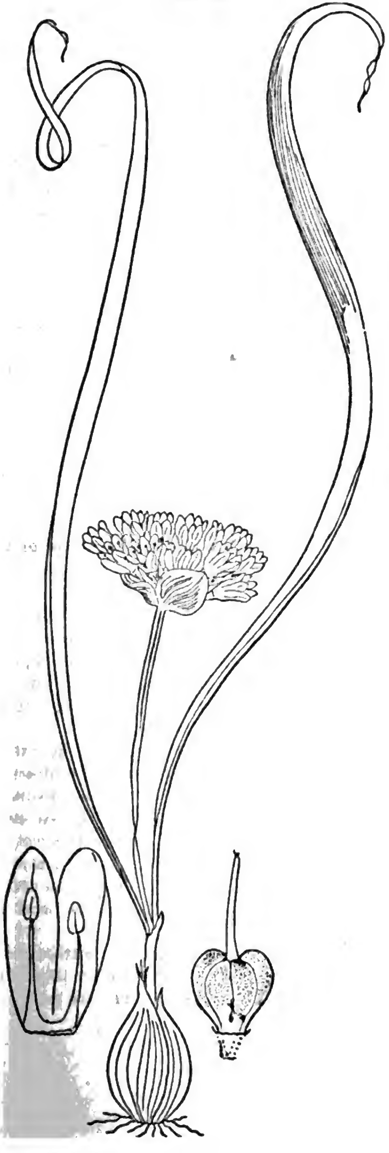
BY A. KELLOGG, M.D.

### ALLIUM L.

*Allium parvum* Kellogg. [FIG. 13.]

Scape short, naked, narrowly ancipital; leaves two, long linear-lanceolate, acute, apex recurved, plain above, much attenuated towards the subterranean base, which is somewhat canaliculate; lamina from five to ten-nerved, margins remotely subscabrulose; flowers pale, purplish, about eight; umbel convex, pedicels triangular, thickening upwards, about as long as the flowers, nerves of the sepals distinctly purple to the tips; three outer sepals longer and broader, erect, entire, oblong, somewhat obtuse, carinate; the three inner linear-lanceolate sub-acute; genitals included, inner stamens slightly longer, anthers pale, blueish, filaments simple, expanded at the base; style equal, stigma acute, simple (or obsoletely lobed); capsule in outline obcordateley trigastric, embryo granular (mature fruit not observed), appears to be somewhat substipitate, as seen in the figure, the three cells somewhat grooved on the back; spathe persistent, two-parted, ovate, sub-acute, about eleven-nerved, hyaline, and lilac purple; bulb ovate, oblong, externally loosely coated with light-colored, smooth-nerved membranaceous tunics. The scape is often found only an inch above ground, as in the recent specimens from Mount Davidson by Mr. Herbert C. Dorr. The leaves are two to three times the length of the scape. Our figure is from a cultivated specimen furnished by Mr. H. G. Bloomer, from bulbs sent us some years since by Mr. Andrew A. Veatch, from Washoe. This is the largest form of it we have yet seen. The bulbs, however, under culture, are often three or four times the size here represented. It has none of the garlic odor so common in this genus.

FIG. 13.



## REGULAR MEETING, AUGUST 17th, 1863.

Dr. Trask in the Chair.

Present, eleven members.

Donations to the Cabinet:

Three boxes of ores from various localities, presented by Dr. Trask. Mr. Lorquin presented a number of land shells collected on the Phillippine Islands by Mr. Lorquin, senior. A box of shells from the Smithsonian Institution.

Donations to the Library:

Verslagen en Mededeelingen der Koninklijke Akademie van Wetenschappen; Afdeeling Naturkunde, Parts 10–14, 1860–1862; Same, Afdeeling Letterkunde, Parts 5–6, 1860–1862; Jaarboek van de Koninklijke Akademie van Wetenschappen te Amsterdam, 1859, 1860, 1861; Proceedings of the Royal Horticultural Society, Vol. iii, Nos. 1–4, Jan. to April, 1863; Nachrichten von der Georg-Augusts Universität und der Königl. Gesells. der Wissenschaften zu Göttingen, 1862, Nr. 1–27.

The above were received through the Smithsonian Institution.

Dr. Cooper read the following paper:

### On New or Rare Mollusca Inhabiting the Coast of California.—No. II.

BY J. G. COOPER, M.D.

The following species were collected while exploring for the State Geological Survey, along the main land and islands bordering Santa Barbara channel, in May, June, and July last. Besides those described as new, I obtained additional specimens of some of those described in 1862, confirming the specific characters then given, and to some extent establishing the generic more accurately.

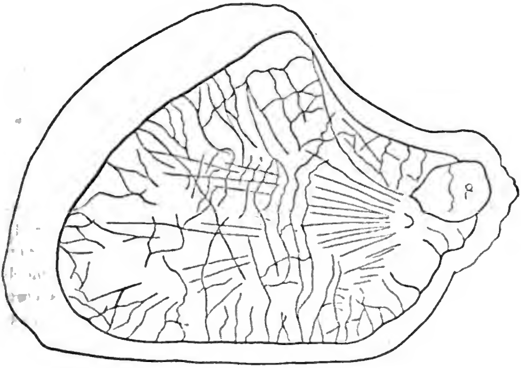
Careful notes and drawings from living specimens furnish the basis of most of the descriptions, together with examination of the specimens in alcohol.

With regard to localities, it must be noticed that "Santa Barbara" and "Santa Barbara Island" are very distinct both in local characteristics and the groups of animals inhabiting them. The island is about seventy-five miles from the town, and thirty-five from the nearest main land. Catalina Island is twenty-four miles from the main land, and very different in its molluscous animals from both the main land and the other islands, being the richest locality on our shores.

I have not been able to compare these species with those from South America described by D'Orbigny and others; but, like our other littoral mollusca, they are probably distinct. I have, however, found the pelagic species *Omma-*

*strephes giganteus* D'Orb in large numbers, and "hundreds" of a species of *Argonauta* washed ashore last spring as far north as Santa Cruz Island, as I was informed by Dr. Shaw, who presented specimens to the State collection.

FIG. 14.



### APLYSIA Linn.

*A. californica* Cooper. State Collection, species 1045.

Form and external appearance as usual in the genus. Length fifteen inches, breadth five, height about the same. Color pale gray or greenish, becoming purplish on the side, folds of mantle with scattered white specks, from which an irregular network of brown lines extends over the rest of the body, interspersed with large brown blotches. Inner surface of mantle varied with alternating painted bars of white and dark brown interlocking together. Sole of foot black. Eyes very minute and black.

*Shell* contained in the substance of the mantle cartilaginous, translucent, trapezoidal or hatchet-shaped, margins rounded, slightly convex above, the nucleus or centre in old specimens distant from the posterior end or apex. Faint radiating lines diverging from the nucleus, crossed by an irregular network of darker lines, all ending abruptly at some distance from the margin, which has thus a wide, nearly transparent border. An accessory plate arises on the inner surface from the nucleus, spatulate in form and slightly raised.

The two younger specimens have the clear border and accessory plate less developed, and very young ones do not probably show these characters at all, but resemble the typical *Aplysia* in the form of the shell. On this account I am unwilling to constitute it a new genus, but propose to call it a sub-genus under the name of NEAPLYSIA.

There was no appearance of a multiplication of shells, said to occur in old specimens of *Aplysia*. Not having any full description of the internal anatomy of *Aplysia*, I cannot at present determine whether there are many other differences in structure.

The stomach was full of large fragments of *Algæ*. I found three specimens only, on the beach at San Pedro, July 25th, just after a heavy blow which occurred at the lowest summer tides. Kept in water for some time, they were very slow and uninteresting in movements, showing no evidence of any means of defence except the exudation of a beautiful purple fluid from the mantle when handled. This fluid, common to the Aplysiæ, though formerly supposed to be poisonous and indelible, possesses no such properties, though it may be a defence against marine animals which attack them.

The figure, taken from a tracing of the shell, and electrotyped by Dr. A. Kellogg, represent the inner surface of the most developed specimen, of the natural size.

### NAVARCHUS, Cooper, Proc. Cal. Acad. Ap. 1863.

#### *N. inermis* Cooper.

Syn. *Strategus inermis* Cooper, Proc. Cal. Acad. II, 1862, p. 202.

One small specimen, dredged among seaweeds in ten fathoms, near the eastern shore of the "Isthmus," Catalina Island, shows no variation from those obtained at San Diego.

### DORIS, Linn.

#### *D. albopunctata* Cooper. State Coll. Species 1000.

Form ovate, pointed behind, flattened, surface shining, minutely rugose. Tentacles club-shaped, retractile, branchial plume, 6–8 parted, bipinnately divided, situated near the posterior extremity. Color yellow or orange brown, dorsal surface thickly speckled with small white dots, each forming a slightly raised papilla. Beneath paler.

Dredged from a rocky bottom in twenty fathoms, a mile from the shore at Santa Barbara. Also found on rocks at low water mark near the north-west end of Catalina Island.

Length about one inch, breadth one-third of an inch.

#### *Doris montereyensis* Cooper, Proc. Cal. Acad. II, 1862, p. 204.

Found at Santa Barbara Island on rocks at low water, differing from the original specimens only in larger size and deeper color. The tentacles are club-shaped, the branchial 7–8 parted, bipinnate and from one opening.

#### *Doris sanguinea* Cooper, loc. cit. (*Asteronotus.*)

Four specimens found with the last, differ from the type only in having the black spots very small. The tentacles are acute, cylindro-conic, retractile into a cavity bordered by a toothed membrane. The branchiæ form an erect chimney-shaped expansion. I cannot discover the stellate valvular structure of the branchial opening, which characterises the genus *Asteronotus*, in these specimens.

#### *Doris Sandiegensis* Cooper, loc. cit.

Two found with the last agree exactly with specimens from San Diego. The tentacles are conical and acute. The branchial orifice does not present the peculiar characters of *Actinocyclus*. Although all these species differ to some extent, they have no characters to distinguish them generically from the typical *Doris*, unless anatomical or microscopical examination should reveal them, or the characters of that genus should be more closely limited.

### TRIOPA Johnston, 1838.

#### *T. catalinæ* Cooper. State coll. species, 1002.

Form much elongated, narrow, dorsal surface flat, becoming spatulate posteriously. Head expanded laterally and flattened, wider than the body, ornamented with 14 ciliæ, equally distributed around its margin, so as to form nearly a circle. Tentacles long, conical, retractile. Three pairs of short ciliæ at equal distances apart between the tentacles and middle of the body, connected by the sharp edges of the dorsal surface. Branchial plume five parted, bipinnately divided, expanding to nearly twice the width of the body, situated a little behind the middle of the body. Two short ciliæ close together on the medium line, a little behind the branchiæ. Length 1.50, breadth 0.25 inch. Color yellowish, speckled with white, filaments vermilion red.

Four specimens found on sea weed among rocks at low water near north end of Catalina Island, June 16th.

### DENDRONOTUS Alder and Hancock, 1845.

#### *D. iris* Cooper. State coll. species 959.

Pale purple, varying to orange red, foot narrowly edged with white, tentacles with white tips and a subterminal orange ring, branchial processes purple, the smaller ones sometimes olive near the base. Length of largest specimens 3, breadth 0.50 inch.

Several found on the beach at Santa Barbara, May 5th, having been washed ashore by an unusually heavy sea, occurring at a very low stage of the tide. One, also, dredged on seaweed, from a depth of 28 fathoms, two miles off shore.

This species seems more variable in color than the other *nudibranchiata* of this coast, but I saw no reason for considering them of more than one species. Those washed ashore being somewhat injured, although still alive, I made no drawing of them, and the more perfect one dredged was too small for this purpose.

In the "Mollusca and Shells," of the U. S. Exploring Expedition under Commodore Wilkes, Dr. Gould mentions a species of Dendronotus collected at Puget Sound, but does not name it or give any clue to its characters, except that the *branchiæ* have white tips, unlike our specimens. It is very probable, however, that it belongs to the same species, as so many of the Mollusca of this coast have an equally wide range.

### ÆOLIS Cuvier, 1798.

#### *Æ. barbarensis* Cooper. State coll. species 978.

Rose-red, longer tentacles tipped with yellow, branchial ciliæ simple, in six longitudinal rows, all short, the middle rows longest and tipped with blue, anterior tentacles two, above the mouth, dorsal tentacles club-shaped, a white streak extending from the median line between them to the mouth. Length nearly an inch.

One specimen dredged on a rocky bottom, in a depth of 16 fathoms, a mile from the shore at Santa Barbara.

Although small, its characters are too different from those of our other species, when of the same size, to allow us to consider it the young of any of them.

### FLABELLINA Cuvier, 1830.

#### *F. opalescens* Cooper.

*Syn.* Æolis, (Flabellina?) opalescens, Cooper—Proc. Cal. Acad. II, 1862, p. 205.

This species, dredged from the same locality as the last, presented exactly the same characters as the original specimens from San Diego. I also found a few of them on the rocky shore of Santa Barbara Island, differing only in having the branchial olive, tipped with white.

### PHIDANIA Gray, 1850.

*P. iodinea*, Cooper—*Syn.* Æolis (Phidania?), iodinea, Cooper, loc. cit. sup.

I found one of this species on the beach at Santa Barbara, agreeing exactly with those from San Diego.

### CHIORÆRA Gould, 1855.

#### *C. leonina* (?) Gould—Molluscs and Shells, U. S. Expl. Exped.

Wholly translucent, pale yellow, the variations marked only by a darker shade. Form of head nearly conical, the apex anterior, forming an angular roof above the oral opening. Branchial processes five on each side, larger than represented in Gould's figure, imbricated and decumbent. Length 2.75, height 1 inch. Otherwise as in the description and figure of Gould's specimen.

A single specimen dredged in 20 fathoms off Santa Barbara, May 15th, differs in the points above mentioned from the northern animal, but being much smaller, the differences may arise from immaturity, and I have therefore preferred to retain the same name for it.

The single specimen which formed the type of the genus was dredged in Puget Sound, was over five inches long and of various bright colors, the head subglobose, higher than oral opening, branchiæ in six pairs, comparatively smaller and erect, all of which differences may have arisen from more perfect development, and from having been observed under more favorable conditions.

From its rarity on our southern coast we may expect to find it more abundant northward.

Dr. Kellogg read a paper describing a new species of ALSINE, collected by Mr. Bolander, in the swamp near Mission and Howard and Seventh and Eighth Streets, San Francisco.

## Description of a New Species of Alsine.

BY A. KELLOGG, M.D.

ALSINE Wahlenb.

*A. palustre* Kellogg.

Plant slender, somewhat decumbent at the base, simple or slightly branching at the summit, glabrous, sulcate on opposite sides of the stem, sub-flexuous, six inches to a foot in height. Leaves lance-linear, acute, mucronate, glabrous, margins scabrous, sub-connate and slightly sheathing at the membranous base, shorter than the internodes (half to more than an inch in length). Peduncles slightly compressed, axillary, solitary, long, naked. Sepals ovate-lanceolate, acute or subacute, one to three-nerved, green with scarious margins, about half the length of the petals. Petals white, oblanceolate, obtuse, entire. Stamens ten, subequal, short. Styles three; stigmas deeply biparted.

A plant very abundant in swamps in this vicinity, known to us for the last ten years, but as we find no description which we recognize, we conclude it must be unknown. Blossoming in July and August. Specimens by Mr. Bolander.

---

## REGULAR MEETING, SEPTEMBER 7th, 1863.

President in the Chair.

Present, seven members.

Donations to Cabinet:

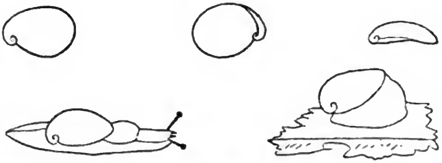
Fishes, crustacea, and shells from the Sandwich Islands, by Andrew Garrett, Esq.

Donations to the Library:

Proceedings of the Boston Society of Natural History, Vol. ix, sigs. 13 and 14, May and June, 1863. Proceedings of the Academy of Natural Sciences of Philadelphia, for April and May, 1863. Proceedings of the Royal Horticultural Society, Vol. 3, No. 5, May, 1863. Silliman's Journal, July, 1863.

Professor Whitney presented the following paper by Dr. J. G. Cooper:

FIG. 15.



# On a New Genus of Terrestrial Mollusca Inhabiting California.

BY J. G. COOPER, M.D.

BINNEYA Cooper.*

*Generic characters.*—General form of animal like *Limax*, with a shell resembling that of *Omalonyx* or *Lamellaria.*

Body about three times as long as shell, semicylindrical, obtuse in front, forming an acute angle behind; foot extending the whole length, somewhat distinct anteriorly, and carinate behind. Mantle shield-like, covering the back anterior to the shell for about one-fourth its length, not reflected over the shell. Eye-peduncles moderate, slender, two short acute tentacles in front of head. Lingual teeth resembling those of Helix in form and arrangement.

Shell entirely external, ear-shaped, nearly flat, about one-third as long as the animal, which it does not half cover when retracted. Spire flattened, forming two horizontal volutions, last whorl enormously expanded and slightly arched. Columella distinct, entire, hiding the interior of the convolutions.

*Binneya notabilis* Cooper. State Coll. Species 988.

*Specific characters.*—Animal dark lead-colored, with black reticulations, and a wide brown stripe along the median line, extending from the mantle to the front of head, about one-fourth of the total length.

Shell with a pale brown, smooth and shining epidermis, extending beyond the margin, translucent when young, becoming thickened by an opaque white deposite on the interior when old. First whorl or nucleus ornamented with about thirty delicate parallel revolving ribs, not concealed by the epidermis, and ending abruptly at the commencement of the transverse lines of growth in the body whorl.

Length 0.46, breadth 0.34, height 0.12 inch.

This genus resembles *Limax* in its shield-like mantle, but in the more essential characters of the lingual teeth, appears to belong undoubtedly to the *Helicidæ.* It approaches nearest to the subfamily *Vitrininæ*, in having the mantle in front of the shell, approaching nearest to the *Daudebardia* of Europe; but differs in the form and opacity of the shell, which resembles some of the *Succininæ*, especially *Omalonyx* of South America, etc. It differs from these very much in the form of the animal, and the shell being wholly external, forming one of those connecting links which make it difficult or impossible to divide the *Helicidæ* into distinct groups.

---

* To all those who have seen the splendid works on the "Terrestrial Mollusks of the United States," by the late Dr. Amos Binney, so ably continued by his son W. G. Binney, the appropriateness of the name will be at once evident.

*Habitat.* So far this animal has been found only in Santa Barbara Island, one of the group within this State. It there inhabits but one station, so far as I could discover after very careful search. That is the head of a ravine facing the south-east and about two hundred and fifty feet above the sea. During the wet season there may be a little water springing from this place, but for at least five months it is not even damp, while the remainder of the island is entirely destitute of water. Myriads of *Helix kelletii* and two other species (probably new) inhabit it, but during the dry season retire into a torpid æstivation, not disturbed by the fogs and mists of summer. The *Binneya*, the rarest of all, and not protected from drought by its shell, burrows down to the under surface of thick succulent roots, and contracting to about twice the size of its shell, covers the rest of its body with a white mucrous secretion, which appears to be impervious to the moisture within, and dries into a tough leathery shell.* When moistened for a few hours, the animal separates the edge of this box from that of its true shell, and becomes active.

The figures [Fig. 15] represent three positions of the shell, the animal æstivating and also crawling.

I found but three alive, and eighteen dead shells.

Dr. Trask presented, in the name of Mr. Garrett, the following paper:

## Descriptions of New Species of Fishes.

BY ANDREW GARRETT, OF HONOLULU, S. I.

### JULIS CUV.

*Julis ornatissimus* Garrett.

D. 9-13; A. 2-13; V. 1-5; P. 12; C. 2, 1, 6, 6, 1, 2.

The body of this *Julis* is rich green, which gradually passes into light blue on the breast and belly. The scales on the green ground are margined with vermillion red, and there is a slight tinge of the latter color on the abdominal scales. Four alternate oblique light red and blue vittæ pass from the middle of the gill-opening, and gradually fade away beneath the anterior portion of the abdomen. The head, which is emerald green, is ornamented with vermillion red stripes, which have their margins shaded off with brilliant blue. The stripes are disposed as follows: one traverses the upper line of profile, two extend from the upper lip to the eye, one follows the lower line of the head, passing up the hinder margin of the gill covers; two horizontal ones on the cheek, and, posteriously to the eye they assume reticulations. Irides golden yellow, with shades of light red; cornea dusky green. The dorsal, anal and caudal fins are carmine red, margined with pale blue. The former with a basal row of large spots, and an intramarginal band, dark green. Two similar bands mark the outer half of the anal fin, and spots of the same color may be observed on the caudal. The ventrals are pale, straw-yellow, with blue, anterior margins. Pectorals have a pale, yellow tinge at their base.

---

* In this it resembles the *Testacellæ* of Europe, which are otherwise very different.

The greatest depth of the body, as compared to the entire length of the fish, is about one to four. The scales are rather large. The head constitutes a little less than a fourth of the total length. In addition to the usual teeth which characterize the genus, we observe a spiniform tooth projecting obliquely forward from the posterior portion of the branches of the upper jaw. The caudal fin is posteriorly rounded off, and the ventrals are long and pointed.

Length, 4½ inches.

Habitat, Sandwich Islands.

REMARKS.—We have observed only a single example of this very rare and beautiful fish, which was captured at the island of Hawaii in 1856. Its peculiar markings will readily distinguish it from any of the numerous species inhabiting our coasts. In shape and markings of the head it resembles *Julis pœcila*, figured in the Zoology of the Voyage of the "Blossom," but the colors of the body and fins are widely different.

### CHIRONECTES Cuv.

#### *Chironectes rubro-fuscus* Garrett.

D. 3-13; A. 9; V. 6; P. 11; C. 9.

A single example of this species now before me has been preserved in spirits several years. It is in fine condition, though the colors are much faded. The general shape is oblong-oval, and much compressed. The thickness at the base of the head enters about five and a half times in the total length. The whole surface is covered with crowded minute hispid asperities, and very small, remote, cutaneous, tuft-like appendages. The head, as viewed in profile, is irregularly rounded, the chin forming the anterior end, being slightly in advance of the mouth. The eyes are exceedingly small, elliptically oval in shape, their greatest diameter being only three-twentieths of an inch. Their distance from the margin of the upper jaw is five times their own length. The mouth is vertical. On the top of the snout, midway between the eyes and the end of the upper jaw, is a long setaceous appendage, articulated to a tubercle, and tufted at the end. On the cranium there are two stout, curved processes, which project posteriorly, the hind one the largest, and both enveloped in the integuments. The dorsal fin takes its origin at a point corresponding to the middle of the total length of the fish, caudal exclusive. Its height equals the length of its own base. The caudal trunk and fin are slightly oblique to the horizontal axis of the body. The anal fin is small and rounded off along its outer margin. The rays in all the fins have their ends slightly prolonged in little fleshy points. The color, as noted from the living fish, is dark red, with irregular, cloud-like markings and spots, dusky gray. Everywhere maculated with small, irregular, dusky spots, which are the most numerous on the belly. A few deep black maculations on the vertical fins and scattering ones on the body. The interior of the mouth and tongue are mottled with red and white. Irides pale flesh color; cornea black. The smooth inner surfaces of the pectoral and ventral fins are intensely red.

Length, 8½ inches.

Habitat, Sandwich Islands.

Remarks.—This fine large species is very rare. As compared with the *C. leprosus* from the same location, it is much larger, more compressed, the eyes much smaller and the ground color is quite different. In the *leporina* the eyes are less than twice their own diameter distant from the anterior margin of the upper jaw. In our fish they are five diameters distant from the same point.

### Chætodon L.

### *Chætodon multicinctus* Garrett.

D. 13-24; A. 3-19; V. 1-5; P. 14; C. 3, 1, 8, 7, 1, 2.

Form oval. The head enters about four and a half times in the total length, The upper line of profile from the snout to the dorsal fin is nearly straight, rising at an angle of 60°. The snout is short. The eye is large, circular, its diameter one-third of the length of the head, and placed just midway between the opercular corner and the end of the snout. The preopercular margin exhibits a few small dentations. The scales are moderate size.

The dorsal and anal fins are posteriorly rounded off, The hinder margin of the caudal is truncate. The anterior soft ray of the ventrals is slightly prolonged beyond the margin of the fin.

Color creamy-yellow. The sides are marked with five vertical, yellowish-brown, diffuse stripes, the two anterior ones terminate on the side of the belly, and the others at the base of the anal fin. There is a slight indication of a sixth one along the basal half of the soft portion of the dorsal fin. Each scale is marked with a faint, yellowish-brown dot. A yellow line starts from a point above the base of the ventral, follows the line of the belly, and unites with a black one which traverses the anal fin. A blue black spot in front of the dorsal fin gradually passes into the ocular fascia, the latter being brown above and yellow beneath the eye. Irides chrome-yellow. Upper lip brown. A vertical black stripe, shaded off anteriorly with vermillion, marks the middle of the caudal trunk. The dorsal spines and filaments are orange-yellow, the interradial membrane is colorless. The soft portion of the dorsal and anal are ochre-yellow along their middle-third, the former with a broad yellow and the latter with a pale greenish margin. The two colors on either fin separated by a narrow black and white line. The caudal is colorless, with a basal vertical luniform bar, its convex margin anterior. The ventrals are whitish, and the pectorals colorless.

Length, 3½ inches.

Habitat, Sandwich Islands.

Remarks.—Two examples of this species were procured in Honolulu market.

### OPHISURUS Lac.

### *Ophisurus Californiensis* Garrett.

This *Ophisurus* is more robust than usual in species of this genus. The head is large, swollen beneath, and comprises about one-twelfth of the entire length. The depth, taken at the origin of the anal fin, enters about twenty-eight times in the total length, or twice in the length of the head. The pectorals are large, elliptical in shape, their tips reaching posteriorly nearly as far as the origin of the dorsal fin. The dorsal and anal fins are well developed, the latter passing over a base considerably more than half the length of the fish.

The color in spirits is brown, paler on the lower half of the head, and cinereous along the throat and belly. A dorsal row of large, roundish, brownish-black spots extends from the occipital region to the end of the tail; the spots being intersected by the fin, and the two anterior ones are saddle shaped. A second row, disposed alternately to the first, occupies the upper half of the flanks. The head is irregularly maculated, the spots becoming paler beneath. The fins are light, brownish-grey; the dorsal and anal with a narrow darker margin, which is articulated with dark brown.

Length, 19½ inches.

Habitat, Lower California.

REMARKS.—The specimen described above, was captured at Margarita Bay, by Mr. White, of the whaler Rambler, to whom I am indebted for a valuable collection of objects of natural history.

Dr. Ayres remarked that he had recently received from Tomales Bay specimens of an ichthyic type, new to this coast, and probably new to science. The species is closely allied to *Scomberesox*, though the jaws are but moderately elongated. It is judged worthy of record, even previous to any description, since no fish of that group has hitherto been found in the waters of California. The specimens exhibited to the Academy were from five to eight inches in length. He also gave notice of the acquisition of a specimen of Thrasher, taken in the Bay of San Francisco. The species is a very close representative of the Atlantic form *Alopias vulpes*, differing, however, in the proportions of the dorsal and anal fins, and in the position of the branchial apertures; the tail constitutes decidedly more than half of the entire length. The specimen is about five feet in length.

Dr. Ayres presented a specimen of Barnacles, found floating at sea in lat. 33° 8′ N., lon. 129° 35′ W., by Capt. Geo. Goodrum of San Francisco. They were of the *Anatifa* type, but exhibited the remarkable feature of being attached, not to some extraneous substance, as a fragment of wreck, for instance, but to a spherical, fleshy receptacle, apparently a portion of their own system. This receptacle was of a light, yellowish color, about the size of a small orange, which it somewhat resembled in aspect. To it were attached, by the usual flexible pedicles, about a dozen Barnacles, allied to *Anatifa*, as above indicated, but differing from it in the breadth of the dorsal plate, and in the projection of a strong keel at the base of both dorsal and lateral plates. When this specimen was procured, myriads like it covered the sea for miles in the track of the vessel. Barnacles aggregated in this manner of growth do not appear to have been hitherto reported.

## REGULAR MEETING, October 5th, 1863.

President in the Chair.

Seven members present.

A donation to the cabinet of several species of fishes from the Sandwich Islands was received from Mr. Andrew Garrett.

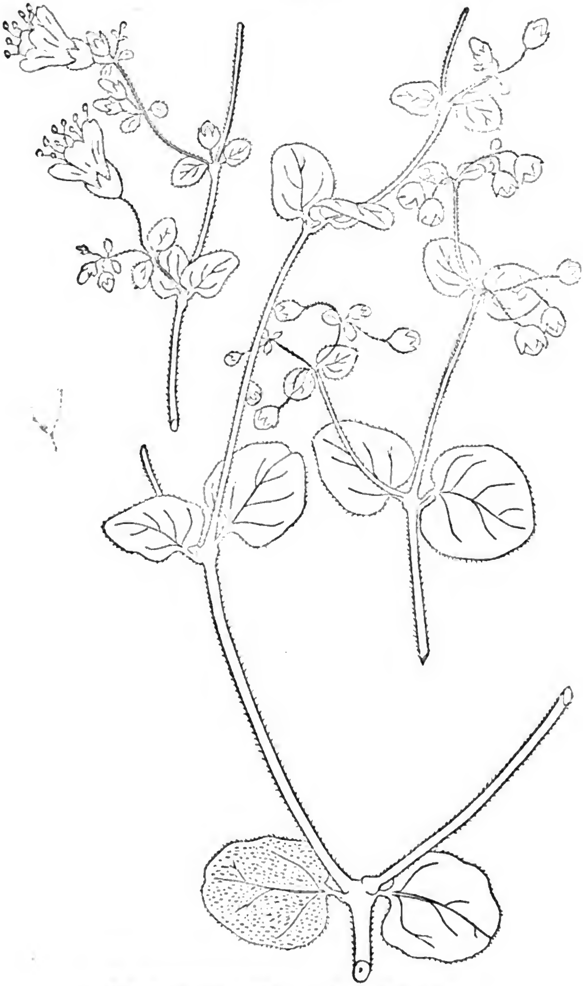
Donation to the Library:

Fragmenta Phytographiæ Australiæ, by Ferdinand Mueller, Vol. III, from the author.

Mr. Bolander stated that he had recently collected two grasses believed not to have been before found on this coast, though common in the Atlantic States, viz.: *Paspalum distichum* (L.) along the shores of Clear Lake, covering large patches of ground, and *Leersia oryzoides* (Swartz), along Cache Creek, of much larger size than he had met with in the East. He believed *Gastridium australe*, which covers almost every dry hill in the interior, to be indigenous.

Dr. Behr made some remarks on the date of introduction of some foreign plants, now becoming very common in this vicinity, which he intends to make the subject of a future article.

Fig. 16.



Mirabilis Californica. Var. *villosa* Kellogg.

[For description see page 10 of this volume.]

## REGULAR MEETING, October 19th, 1863.

President in the Chair.

Six members present.

Dr. Ferdinand Mueller was elected an Honorary member. Frederick Wideman, of Sinaloa, Alex. Drauphing of San Sebastian, and S. W. Morrell, of Mazatlan, were elected Corresponding members.

Dr. Cooper exhibited specimens of *Lagomys princeps*, the "Little Chief Hare," from the summits of the Sierra Nevada. He remarked that this rare animal lived about the limits of perpetual snow, and was so rarely seen that residents for several years near its resorts had never seen it. He found it quite common in a very limited district, though difficult to obtain, from its extreme shyness. Though before found in the Rocky Mountains near South Pass, and Salt Lake, where it is called "Coney," this was the first record of its occurrence so far to the west and south.

---

## REGULAR MEETING, November 2d, 1863.

President in the Chair.

Twelve members present.

Mr. W. G. Binney, of Burlington, N. J., George N. Lawrence, of New York, and William Cooper, of New York, were elected Corresponding members.

Mr. Lorquin presented two species of California Jays for the Cabinet.

Donations to the Library:

Annuaire de l' Academie Royale de Belgique, 1863. Bulletin de l' Academic Royale de Belgique, tomes XIII, XIV. On time boundaries in Geological History, by James D. Dana. On the higher subdivision in the classification of Mammals, by James D. Dana. On Cephalization, and on Megasthenes, and Microsthenes in classification, by James D. Dana. Proceedings of the Natural History Society of Dublin, sessions of 1860–62. Memoir on California Mosses by Leo Lesquereux.

Dr. Cooper presented the following paper:

## On new Genera and Species of California Fishes—No. I.

BY J. G. COOPER, M.D.

The fishes described in the following articles were collected by me for the State Geological Survey, along the Southern Coast of this State and among the adjoining islands. While it is possible that some of them may have been described in works not now accessible to us, the probabilities are entirely in favor of their being new, as we have very recent lists of all the species described as inhabitants of this Coast since the report on fishes collected by the Pacific Rail Road Surveys.

For much information and assistance in their determination, I am indebted to Dr. W. O. Ayres, and also to Dr. George Hewston, for the use of books not contained in any public library in the city.

The outline illustrations, reduced from accurate measurements, were electrotyped and presented by our industrious collaborator, Dr. Kellogg.

The colors described are in all cases those of the living fish.

### DEKAYA, n. g.*

*Generic characters.*—General shape elongated and fusiform, head small and short, premaxillaries slightly protractile, eye large, situated above the level of mouth, profile moderately sloping, snout broad and obtuse.

Preoperculum serrated behind, operculum with one obtuse spine; branchiostegal rays five on each side. Opercular openings connected below.

Front rows of teeth on premaxillaries small, conical, acute, and slightly recurved; those of upper jaw largest, their size decreasing from the middle towards each angle, where there are one or two large canines; those below hidden by the upper jaw. Behind this row in both jaws, a band of velvet teeth in about six irregular rows near the symphysis, but ending entirely near the middle of each ramus. Tongue and vomer toothless. Pharyngeal bones and branchial arches densely crowded with large velvet teeth.

Infraorbital bone short, curving up under posterior border of orbit, and not connected with the operculum.

Nostrils double, anterior opening smaller, lips rather thick and fleshy.

Scales small, numerous, oblong, subquadrangular, finely pectinated, covering the whole body and head as far as front of orbit, but leaving a bare space around the eye.

Fins scaleless, as well as caudal rays. Dorsal and anal fins very long at base; spinous rays few. Lateral line normal.

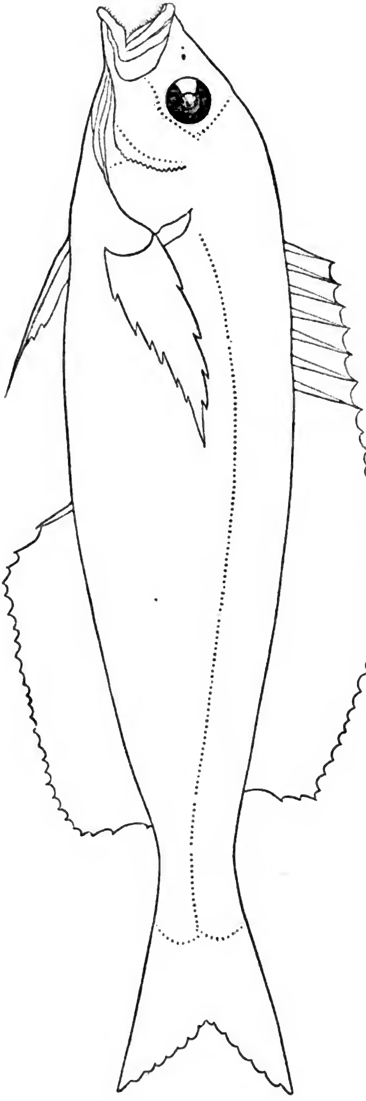
DEKAYA ANOMALA, Cooper, n. sp., State coll. No. 618. [Fig. 17.]

*Specific characters.*—Length of head contained five times in total length. Distance from end of snout to orbit one-third the length of head, and greater than

---

* Named in memory of the distinguished author of the Zoological portions of the "Natural History of New York, Dr. James E. Dekay.

FIG. 17.



width of orbit. Height of head just behind orbit about equal to distance from tip of snout to edge of preoperculum; breadth one-third to one-half of its length. Skin on occiput elevated from the bone by a thick layer of fat, not by any bony expansions.

Height of pectoral fin less than length of head; its width about one-third of its height, middle rays longest.

Dorsal arising above pectoral joint, its length one-third that of the fish; first spine one-ninth the length of the fin; the other spines lengthening to the commencement of the soft portion, of which the longest ray is one-fifth the length of the fin, and the last ray one-fifteenth; the entire fin having a gradually arching outline.

Caudal moderately broad, deeply forked, and acutely pointed; the upper lobe slightly the largest.

Anal similar in form to dorsal, arising opposite its eighth soft ray and prolonged a little farther back. It is three-fifths as long as dorsal, its height about one-fourth its length, the first (spinous) ray and the last each half as long as the longest.

Ventrals four-fifths the height of pectorals, arising immediately behind them; their width one-third of their length.

**D. VII, 23—2, C 3-1-6-6-1-3, A I-2-21-2, P 6-1-11, V, I-1-1-3. Scales 175, $\frac{1}{3}\frac{3}{2}$—$\frac{1}{1}\frac{0}{0}$.**

*Colors.*—Pale silvery brown, white below; an obscure row of brown spots and mottlings on sides; fins and tail olive near base; iris dark brown and gilt.

*Remarks.*—This fish seems to be a very aberrant form of the Percoid family, having many of the characters of other orders. Its general form and dentition are those of some Sciaenoids, while its entire dorsal, opercular armature and only five branchiostegals separate it both from them and the Percoids. The very long anal is another character found in few if any members of these families. I can find nothing in the pharyngeal bones to indicate its affinities, these being closely like those of both the above families as shown in *Seriphus politus* and *Paralabrax clathratus*, which on comparison have them almost exactly similar.

The genus *Heterognathodon*, of Bleeker, has several of the most peculiar characters of this one; but not having a full description of it, I cannot compare them. There are generic differences at least, and the habitat is widely different, being the East Indies. Richardson places it with other aberrant genera in the family *Theraponidae*—(*Datninae*, of Swainson,) which is probably a mixture of several.

The outline figure represents the fish one-third the natural size; 22 inches.

This fish is caught rather plentifully in autumn at Catalina Island, where I obtained the one here described, in October, 1861. During my late visit there, in June and July, none would bite, and I have not yet obtained any duplicates. It is called by the very vague name of "White-fish."

The figure being made from a skin may be a little inaccurate in proportions; but I hope to be able to present a better one in the Report of the Geological Survey.

This white-fish is not remarkable for excellence as food.

### Ayresia, n. g.*

*Generic characters.*—Form elongated, suboval; the outline more curved above than below. Scales large, finely pectinated, completely covering the body and head, except in front of orbit; smaller on head, and becoming very small where they extend over parts of the fins and tail.

Teeth numerous, acute, entire, the anterior row largest; those below larger than above, and flattened posteriorly. A few smaller ones crowded behind these near symphysis. Pharyngeals villiform.

Premaxillars protractile, the upper arched, twice as high as wide, the lower shutting within it.

Preoperculum entire, a very small obtuse spine at angle of operculum.

Pectorals rather long and pointed. Caudal deeply forked, the lobes acute. Dorsal long, anal moderate.

Differs from *Pomacentrus* (Lacepede) chiefly in a more arched dorsal outline, armed operculum and unarmed preoperculum, pointed fins and tail, proportions of fins.

The dorsal outline appears to become much more convex with age, chiefly from deposit of fat on the occiput, as is the case in some Labroids, as for instance, *L. pulcher* (Ayres) and *Julis modestus* (Girard), the latter also growing higher in proportion to its length throughout. The dotted line represents the dorsal outline of a specimen one-fourth larger than that figured, but otherwise closely like it.

Ayresia punctipinnis, Cooper, n. sp., State coll. No. 596. [Fig. 18.]

*Specific characters.*—Head forming less than a fourth of total length (0.18), eyes less than one-third the length of head, and less than its own diameter from end of snout, height of head behind orbit about equal to its length. Greatest thickness of body about one-eighth of total length.

Height of pectoral equal to one-fourth the distance from snout to fork of tail (0.21). Dorsal commencing above pectoral joint, its spinous portion nearly one-third of its total length, and one-sixth of its height, the first spine shortest. Soft rays becoming three times as high, forming an obtuse point behind; the last ray about as long as the spines (the first dorsal spine should be one-fourth longer than in the figure). Caudal peduncle slightly contracted, shorter than caudal rays. Fork of tail extending half-way to its base, the upper lobe longest, being one-fifth of the total length. Anal commencing beneath the tenth dorsal spine, and ending a little anterior to end of soft dorsal, its base less than one-sixth of total length (0.17).

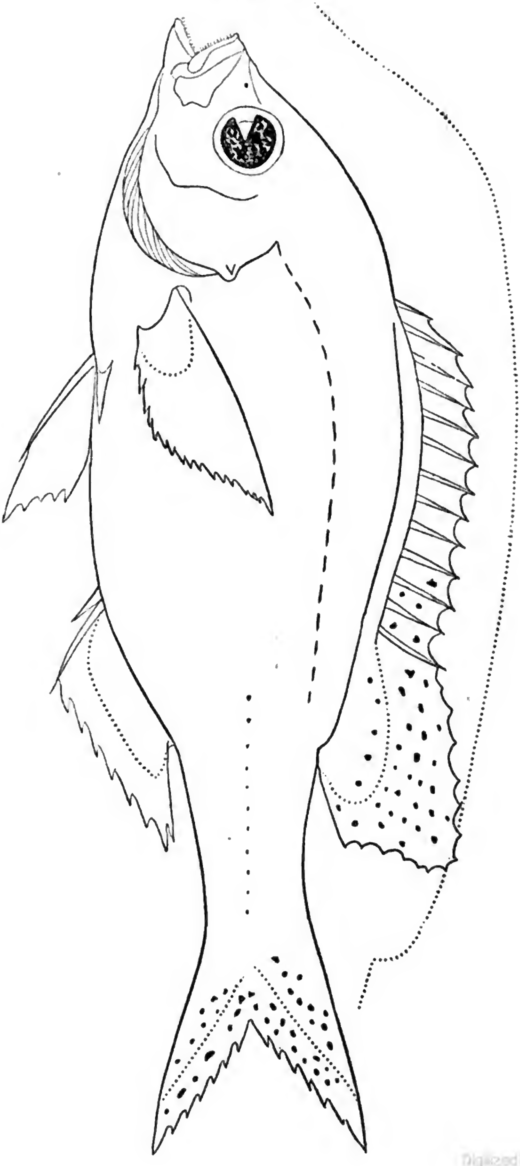
Br. V-V D.XIII, 6-1-6, C. 3-1-6 6-1-3, A.II-11, V. I-8, P-19. Scales 30 $\frac{3}{8}$ $\frac{4}{9}$ $\frac{3}{8}$ lat. line ant. 19.

*Color.*—Bluish or greenish-black; sides, paler, sometimes coppery, fins smoky, the dorsal and caudal spotted with black, iris bronzed brown. Beneath whitish in young, all the hues darker in the old fish. Some are also spotted on the body posteriorly.

---

* The name of Dr. W. O. Ayres, is well known in connection with Ichthyology, especially that of California.

Fig. 18.



In the winter of 1861–2, I caught several in San Diego Bay, which bit freely at the usual baits. I did not hear any peculiar name applied, but they are confounded with "Perch," which they little resemble. Also found at San Pedro.

A larger one, taken in a net at Santa Barbara Island, in May, 1863, has the different characters supposed to indicate an older fish, and is much fatter; its head is also shorter in proportion, but as I find a similar difference in specimens of *Girella nigricans* Ayres, as well as in the Labroids before mentioned, I must consider these as sexual differences, or in part depending on age and condition. They do not differ more than some specimens of *Embiotoca jacksoni* from each other, and agree closely in the number of spines and rays of their fins.

### ORCYNUS, Cuvier, 1819.

ORCYNUS PACIFICUS, Cooper, n. sp., State collection, species 1033. [Fig. 19.]

*Specific characters.*—General profile elliptical, height of body nearly one-quarter its length, breadth about half the height.

Head laterally compressed, somewhat flattened on top, the nose horizontally rounded, but laterally pointed. Base of tail vertically compressed, one-third broader than it is high. Head half the length of body, its height behind orbit equal to half its length. Diameter of orbit one-sixth the length of head, its form obliquely oval. Jaws equal, gape of mouth one-third the length of head.

Pectoral fin, arising at middle of vertical of side, nearly half the total length, its width at base one-eighth of its length, but suddenly narrowing to one-fifteenth, which width it retains nearly to the end, its outer third curving gradually downward, and becoming pointed. First dorsal commencing directly above pectoral, its length nearly one-fourth of total length, and its height in front two-fifths of its length. Spines rapidly decreasing in length from the first to the eighth, the next six about equal, and a third of the first, the last one very short. Second dorsal immediately behind the first and a little higher, triangular, nearly one-third higher than long, its base lengthened posteriorly, and one-third the length of the first dorsal. Finlets eight above and eight below, acutely triangular, those near the middle a little larger.

Caudal large, its lobes equal, their length three times their width, and one-third that of the pectoral; posterior outline arcuately concave, with slightly widened lobes near the middle.

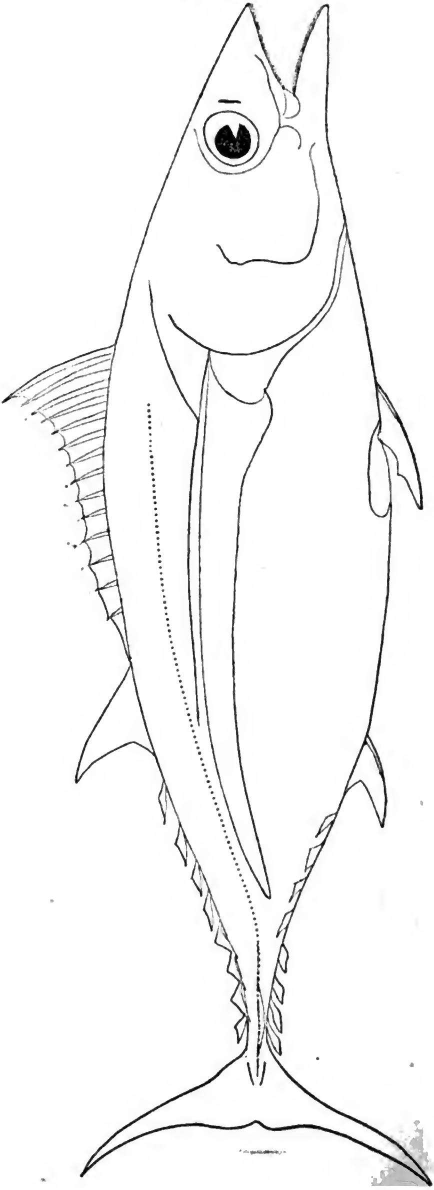
Anal opposite end of second dorsal, similar to it in form, but smaller, and about twice as high as long, its position half way between the ventrals and caudal. Its first spine is only about one-third as long as the second, which is two-thirds the height of fin; both concealed by the skin.

Ventrals arising opposite second dorsal spine, about twice as high as wide, their inner margin with a small pointed lobe.

Cartilaginous ridge on side of caudal peduncle moderate, highest anteriorly, its length half that of caudal lobe. Two slight oblique ridges behind the median ridge.

Lateral line imperceptible in front of fourth dorsal spine, parallel with outline of back. No scales on head. Thoracic corselet of very large consolidated

Fig. 19.



scales above pectoral, bordered by six rows of large distinct scales, which grow smaller from before backwards. Scales underneath ventrals and around other fins, similarly consolidated, and depressed under pectoral and ventral. Rest of scales nearly uniform in size.

Teeth numerous, very small, in one row, the palatine dense and velvety. Rays of second dorsal and anal fins nearly hidden by adipose skin.

**Br. VI-VI D.XIV-12 + 8, P 32, V, 1-8 A.II-8, + 8 C.11-1-6-6-1-12.**

*Colors.*—Above blackish, sides steel-blue, below silvery white, fins smoky, iris brown, finlets yellow edged with blue.

The largest I saw measured thirty-three inches to fork of tail. and weighed twenty-five pounds.

Numerous in summer among the islands off the southern coast of this State, and is said to occur as far north as San Luis Obispo. It affords excellent sport, being caught by trolling while sailing very rapidly, biting voraciously at a white rag. It is in my opinion the best fish for the table that is caught on this coast, but it is said to be sometimes poisonous.

It belongs to the typical *Orcynus* of Cuvier, distinguished from *Thynnus*, by the very long pectoral, eight pairs of finlets, small corselet, etc. The type of *Orcynus* (Scomber alatunga, Linn., or O. alalonga, Duhamel), is called "Ala longa" (Long-wing) in the Mediterranean and resembles this species closely, but is figured as less high and with a smaller pectoral fin.

This species is one of several confounded by sailors under the Spanish names of Albicore and Bonito. The English name Tunny is applied to an allied species on the coast of Europe, the *Thynnus vulgaris*, Cuv., and to its near representative the *T. secundi-dorsalis*, Storer, of the eastern American coast. These, however, are evidently of a different genus, and as *Thynnus* is preoccupied in insects, the name *Orycnus*, applied by Gill to the same type, may perhaps be retained, although *founded on a mistake. O. coretta*, Cuv. and Val., probably represents our species in the Gulf of Mexico.

## REGULAR MEETING, NOVEMBER 16th, 1863.

Dr. Kellogg in the Chair.

Six members present.

Dr. Cooper read a letter from Mr. A. S. Taylor, now of Santa Barbara, complaining that his name had been omitted from the list of corresponding members, though he was elected several years since. It was resolved that his name be restored, having been omitted on account of his new address being unknown to the Secretary.

Mr. Bolander read the following article:

## Enumeration of Shrubs and Trees growing in the vicinity of the mouth of San Francisco Bay.

BY HENRY N. BOLANDER.

The territory in question is divided naturally into three parts:

1. The northern part of the peninsula of San Francisco, with an undulating and hilly surface, consists of drifting sand, with a small per centage of humus mingled with it.

2. The Oakland Hills, running N. 54° W. mag., from the Bay of San Pablo to San Leandro, a distance of twenty-three miles, with the adjacent slopes and valleys. Heavy clayey soil predominates; but where shrubs and trees grow it is mostly a loose, light, and slightly sandy soil.

3. That part of Marin County between San Rafael, the head of Tomales Bay and Bolinas Bay, forming a triangle, with a hilly surface, the ridges running N. 54° W. mag. Soil a heavy clay, in the valleys and on bare hills; or a light, slightly sandy loam among shrubs and trees.

In all parts a metamorphic sand-stone underlies the soil.

*Berberis* (*Mahonia*) *Aquifolium* Pursh.

A low evergreen shrub, three to four feet high, not gregarious; in clay soil on the hill sides; rare.

*Dendromecon rigidum* Benth.

A shrub with slender upright branchlets, four to six feet high, rare; on white sand-stone, Oakland hills, third range eastward, not gregarious.

*Rhus diversiloba* Torr. and Gray. POISON OAK.

Everywhere, deciduous, exceedingly variable, three to eight feet high.

*Negundo Aceroides* Mœnch. BOX-ELDER.

A medium sized tree, twenty to thirty feet high; common among the Oakland hills, on banks of creeks.

*Acer macrophyllum* Pursh. LARGE-LEAVED MAPLE.

Common on the banks of Walnut Creek, N.W. of Mount Diablo; fifty to seventy feet high, and two to five feet in diameter, in light sandy soil.

*Æsculus Californica* Nutt. HORSE-CHESTNUT.

Mostly a shrub, seldom a medium sized tree, largest on the banks of creeks and moist hill sides; grows commonly in groups. Common.

*Euonymus Occidentalis* Nutt. SPINDLE-TREE.

A shrub seven to fifteen feet high, with slender upright branches; in swampy places, near the head of Tomales Bay; rare.

*Frangula Californica* Gray. CALIFORNIA BUCKTHORN.

Very common, variable, four to ten feet high; evergreen, gregarious, in clayey soil.

*Ceanothus thyrsiflorus* Esch. CALIFORNIA LILAC.

Very common, and variable in size, sometimes handsome trees; exceedingly gregarious, forming dense chaparral, on the northern and eastern slopes of hills and mountains; evergreen. Much cultivated on account of the profusion of its fragrant flowers, and the various shapes that may be given it by trimming.

*Ceanothus rigidus* Nutt.

Low, straggling, four to six feet high, less gregarious than the former; on the white sand-stone hills, east of Oakland.

*Ceanothus* ———.

A small shrub, three to four feet high, with very small glandular leaves; mostly single or in groups, on Mount Tamal Pais at 2,700 feet elevation.

*Lupinus albifrons* Benth. SILVER-LEAVED LUPINE.

Very common in almost pure sandy soil, oblong in outline, two to six feet high; growing mostly single, evergreen.

*Lupinus macrocarpus* Hook. and Arn. YELLOW LUPINE.

Large, spreading, oval in outline, evergreen, with large fragrant flowers; gregarious in moist gravelly places along the shore of the bay, and in depressions, or banks of runs, where the soil partakes of a clayey nature.

*Pickeringia montana* Nutt.

Large, spreading, four to seven feet high; evergreen, and gregarious on the Oakland white sand-stone hills.

*Cerasus Ilicifolia* Nutt. CALIFORNIA CHERRY, OR PLUM.

A small tree, eight to fifteen feet high, with thick, shining, spinously serrate, evergreen leaves; fruit of a yellowish pink color, with a thin pulpy external portion. Hill sides on the peninsula of San Francisco, growing mostly in groups; rare.

*Cerasus serotina* Ehrh. BLACK WILD-CHERRY.

A group of three or four small trees, eight to twelve feet high, near a road in the Oakland hills. Undoubtedly introduced from the Atlantic States.

*Cerasus emarginata?* Dougl.

A small shrub, three to four feet high, with very slender reddish and white dotted branchlets, and deciduous leaves; rare. Tamal Pais, 2,700 feet elevation.

*Nuttallia Cerasiformis* Torr. and Gray.

Oblong in outline, four to six feet high, deciduous; common on the northern slopes of hills, in clayey soil. Along the bay and Oakland hills.

*Spiraea Opulifolia* Linn. NINE-BARK.

Large, spreading, eight to fifteen feet high; common on the banks of creeks among the Oakland hills.

*Spiraea Ariæfolia* Smith.

Common on banks of creeks and northern slopes of hills, Oakland.

*Cercocarpus parvifolius* Nutt.

Rare, on the hills in Marin County. Its spirally-tailed seeds give the shrub an appearance as if in full blossom,

*Adenostema fasciculata* Hook. and Arn.

Oblong in outline, four to five feet high; very gregarious, forming extensive dense chaparral on the southern and western slopes of the Oakland hills; evergreen.

*Rubus Nutkanus* Lindl. THIMBLE-BERRY.
*Rubus velutinus* Hook. and Arn.
*Rubus macropetalus* Dougl. BLACKBERRY.
Northern slopes of hills, Oakland and Marin County.

*Rosa blanda* Ait. WILD ROSE.
Very common on the banks of creeks, forming thickets. Oakland hills and Walnut Creek.

*Rosa gymnocarpa* Nutt.
Hill sides, Oakland. A small but beautiful species, rather rare.

*Photinia Arbutifolia* Lindl.
A handsome evergreen tree of medium size, in sandy soil. Common everywhere in the vicinity of water and springs.

*Amelanchier Canadensis. Var. Alnifolia* Torr. and Gray. SERVICE-BERRY.
Northern slopes, four to twelve feet high; in clayey soil, at Mission Dolores and Oakland hills.

*Ribes divaricatum* Dougl. BLACK GOOSEBERRY.
*Ribes glutinosum* Benth. RED GOOSEBERRY.
*Ribes malvaceum* Smith. BLACK CURRANT.
Banks of creeks and northern slopes.

*Whipplea modesta* Torr.
In loose, light soil, in the Redwoods; one to two feet high, rare.

*Cornus pubescens* Nutt. SOFT-LEAVED DOGWOOD.
Large, spreading, ten to fifteen feet high. Banks of creeks, Oakland hills.

*Lonicera involucrata* Banks. TWIN-BERRY.
Large, with slender upright branches, ten to fifteen feet high. Borders of creeks and swamps, Bay of San Francisco, Oakland, Marin County.

*Lonicera Californica* Torr. and Gray; *et var. hispidula.* HONEYSUCKLE.
Slender, climbing; borders of streams. *L. hispudula*, on the out-croppings of white sand-stone, Oakland hills.

*Symphoricarpus racemosus* Michx. SNOW-BERRY.
Forming thickets in depressions on the Oakland hills, at 2,000 feet elevation, and along streams in the valleys. Clay soil—three to four feet high.

*Sambucus glauca* Nutt. ELDER.
*Sambucus pubens* Michx. RED-BERRIED ELDER.
Dry hill sides and borders of wet places. *S. glauca*, often tree-like and twenty feet high. Oakland, Marin County.

*Aplopappus Laricifolius* Gray.
A low fastigiate-branched shrub, one to three feet high; very common in drift-sand on the peninsula of San Francisco.

*Linosyris* ——— ?

A beautiful little shrub, three to five feet high, with upright branches and long linear leaves, densely set. Branchlets and leaves covered by a resinous exudation. In glades on the northern slopes of Tamal Pais, 1,500 to 2,000 feet elevation.

*Grindelia* ——— ?

A low shrub, two to six feet high, bordering the channels in the salt marshes at Oakland and San Rafael.

*Baccharis consanguinea* D. C.

*B. pilularis D. C. et B. glomeruliflora Hooker*, seem to be identical. It is an exceedingly varying shrub; on sandy soil, low, creeping, with numerous fastigiate branchlets, the flowers mostly pistillate, and the heads less crowded; on clayey soil, especially on the banks of creeks, it is often fifteen feet high, quite tree-like, oblong in outline, the flowers mostly staminate, and the heads very much crowded. All forms are subject to excrescences, but especially those growing in a sandy soil. Evergreen.

*Bahia Artemisiæfolia* Less.

Ovate in outline, two to three feet high, evergreen; common on northern slopes, shores of the bay, and Oakland hills.

*Artemisia filifolia* Torr. WORMWOOD.

Large root-stocks with numerous slender branches, three to four feet high. Occupying almost invariably the southern slopes in common with Diplacus glutinosus. Both plants, on account of the leaden color of their leaves and branches, give the southern slopes that barren appearance, contrasting so strongly with the vegetation of the northern slopes.

*Artemisia pachystachya* D. C.

Sandy soil, three to four feet high. Peninsula of San Francisco.

*Vaccinium ovatum* Pursh. EVERGREEN HUCKLEBERRY.

A beautiful shrub, five to ten feet high, with slender upright branches; berries delicious. In light sandy soil, on the eastern slopes of Oakland hills.

*Arbutus Menziesii* Pursh. Madroña.

Evergreen, twenty to thirty feet high, on the northern and eastern slopes of the Oakland hills, but more common and generally larger and finer on the hill sides near San Rafael.

*Arctostaphylos tomentosa* Dougl. Mansañita.

Low, straggling, evergreen, and gregarious on the out-croppings of white sandstone in the Oakland hills.

*Arctostaphylos pungens* H. B. K. Mansañita.

Obovate in outline, ten to fifteen feet high; scattered.

*Gaultheria Shallon* Pursh. MARIS. SALLAL.

Low, creeping, evergreen, covering large tracts of land among the hills of Marin County. Berries eatable.

*Azalea occidentalis* Torr. and Gray.

On the banks of creeks in Marin County. Quite common; five to twelve feet high.

*Diplacus glutinosus* Nutt.

Southern and western slopes. Resinous, eight feet high; common.

*Sphacele calycina* Benth.

Mostly gregarious, five to eight feet high. Near the coast, Marin County; eastern slopes near San Mateo.

*Eriodiction Californicum* Benth.

Very glutinous, two to four feet high—evergreen. Dry hill sides, Tamal Pais.

*Solanum umbelliferum* Esch.

A slender evergreen shrub, two to four feet high on the bluffs of the bay.

*Fraxinus Oregana* Nutt. OREGON ASH.

On the banks of creeks, Marin County; twenty to thirty feet high.

*Oreodaphne Californica* Nees. SPICE BUSH, MOUNTAIN LAUREL, BALM OF HEAVEN.

Often a large tree in moist localities, forty to fifty feet high, sometimes three to six feet in diameter; used for ship-building.

*Dirca palustris* Linn. LEATHERWOOD.

Very common on the eastern slopes of the Oakland hills, where its flowers make it very conspicuous in spring; two to four feet high.

*Croton (Hendecandra) procumbens* Hook and Arn.

A very low shrub, common on the peninsula of San Francisco, in almost pure sandy soil.

*Garrya elliptica* Lindl.

Mostly a shrub with slender branches, but sometimes a small-sized tree; evergreen, gregarious, in sandy soil in this city, and on the eastern slope of the Oakland hills.

*Platanus racemosa* Nutt. SYCAMORE.

Banks of San Leandro Creek, Oakland hills.

*Alnus viridis* D. C.

A large tree on the banks of creeks, Oakland hills.

*Myrica Californica* Cham. and Schl. WAX MYRTLE.

Mostly a medium sized tree, in moist localities and on the eastern slopes of Oakland hills.

*Juglans rupestris* Engelm. Var. *major* Torr. WALNUT.

A beautiful large tree, forty to sixty feet high and two to four feet in diameter, with rather smooth bark and dense, graceful foliage; it may well vie with its Eastern congeners. Banks of Walnut Creek east of the Oakland hills.

*Castanea chrysophylla* Dougl. CALIFORNIA CHINQUAPIN.

A low, straggling evergreen and gregarious shrub, occurring only on the outcroppings of the white sandstone in the Oakland hills.

*Quercus densiflora* Hook and Arn.

Tamal Pais and Redwoods of Marin County.

*Quercus agrifolia* Nees. LIVE OAK.

A shrub as well as a large tree; everywhere in moderately moist situations.

*Quercus tinctoria var. Californica* Torr. BLACK OAK.

Hill sides, Marin County.

*Quercus lobata* Nées. WHITE OAK.

Hill sides Marin County and banks of Walnut Creek.

*Quercus acutidens ?* Torr. SCRUB OAK.

Evergreen; forming dense chaparral on Tamal Pais.

*Corylus rostrata* Ait. BEAKED HAZELNUT.

Very common on the eastern slopes of the Oakland Hills. A shrub four to six feet high.

*Salix* (four species.) WILLOW.

Wet grounds everywhere, six to twenty feet high.

*Populus tremuloides* Michx. ASPEN.

A medium sized tree on the banks of Walnut Creek.

*Torreya Californica* Torr. CALIFORNIA NUTMEG TREE.

A large tree with long spreading branches, and rather smooth bark. Wood valuable; rare, on banks of Papermill Creek, Marin County.

*Sequoia sempervirens* Endl. REDWOOD.

A very large tree, forming small groves on the northern slopes of hills in Marin County, and on the eastern slopes of the Oakland hills.

*Pinus insignis* Dougl.

A small tree ten to fifteen feet high, on the outcroppings of white sandstone in the Oakland hills, third ridge eastward; rare.

*Pinus contorta* Dougl.

A medium sized tree, ovate in outline. Hills of Marin County; rare.

*Abies Douglasii* Lindl. OREGON PINE.

A very large tree, yielding excellent timber. Grows with S. sempervirens in small groves on the northern slopes of hills, Marin County.

*Cupressus Mac-Nabiana ?* Murray. CEDAR.

A spreading shrub, eight to twelve feet high, on Tamal Pais; rare.

Dr. Behr presented the following article:

## On Californian Lepidoptera—No. III.

BY H. BEHR, M. D.

The following species of butterflies were mostly collected by the members of the State Geological Survey, among the higher regions of the Sierra Nevada; but some of them are from other portions of California.

### DANAIS, Latr.

1. *Danais Archippus*, Cramer.

This species was found everywhere, both on the plains and at the highest elevations, up to the limits of Lepidopterous life, 10,500 feet above the level of the sea. The specimens caught in the Sierra were in a poor condition, and differed remarkably in habits from those found near San Francisco Bay. Like most Danaids, ours is rather a lazy and heavy butterfly, gifted it is true with great power of flight, which is shown not by swiftness, but by perseverance. It is however quite easily caught. But according to the statement of Mr. Hoffman, of the Geological Survey, this same Danais was on the mountain summits so restless and active that although very common, only two specimens could be obtained.

We consider these specimens as something like "enfans perdus," of an otherwise respectable family, led away by an innate desire to strive against the current. Thus they struggle against the mountain breeze until finally they reach the bleak heights of the Sierra, where such tropical forms contrast strikingly with the alpine flora.

### ARGYNNIS, Fabr.

2. *Argynnis montivaga*, Behr, n. sp. [Argynnis, No. 4. Proc. Cal. Acad. II, 1862, p. 174.]

If, as I strongly suspect, this species is still undescribed, I propose for it the above name. It is not found near this bay, but seems to be widely spread through the Sierra from whence I have specimens collected at different localities. Those obtained by the Geological Survey are from an elevation of 10,500 feet.

3. *Argynnis rupestris*, Behr, n. sp. [No. 6 of former article.]

To the diagnosis formerly given I add the following character:

Margo anterior alarum anteriorum subtus quam disco pallidior.

The saturated coloration of the radical half of the hind wings, is not always equal in its extent beyond the middle macular fascia, so that the diagnosis of No. 9 is in some respects near enough to cause confusion, if it were not that in No. 9 the anterior margin of the forewings is always decidedly darker than the disk, furnishing a good diagnostic character. In general aspect they differ enough to be recognized at the first glance, but it is very difficult to describe the other differences.

The name I propose for No. 6, is derived from its inhabiting the steep rocky declivities characterizing the lower part of the Sierra. The specimens were collected by Prof. Brewer at a moderate elevation above the sea.

4. *Argynnis monticola*, Behr, n. sp. [No. 8 of the former article.]

This species was found in Yosemite Valley and some other localities, being apparently not rare.

5. *Argynnis Antithore*, Boisd.

One specimen only from Yosemite Valley.

### Melitæa, Fabr.

It will be necessary to give a monograph of this genus before we go on with the enumeration of the mountain species.

We have in California *eleven* well-marked species, a number far exceeding those of the Atlantic Slope, and about equal to those of the whole of Europe. In the "Synopsis of North American Lepidoptera," written for the Smithsonian Institution by John G. Morris, I find only two Californian species mentioned and described, viz.: *M. Editha* and *M. Palla*, the "*M. Zerene*" of the same work being without doubt an Argynnis. In a catalogue published by the same author in 1860, I find besides those just mentioned another, viz; *M. Chalcedon*.

Dr. Boisduval names several Melitæa in his letters to me, but gives no diagnosis.

Our Californian Melitæa belong to four types.

Type I. The first is that of *M. Tharos*, represented by four distinct species in California. This type is peculiar to the American Continent, occuring also in the Atlantic States, and in the tropics.

Type II. That of *M. Athalia*, represented by *M. Palla*, and several others. It is also abundantly represented in Europe, but seems to be wanting in the Atlantic States.

Type III. That of *M. Phaeton*, corresponding exactly to the European, *M. Maturna*, *M. Artemis*, etc., is represented in California by *M. Editha*, *M. Chalcedon*, and others.

Type IV. That of *M. Leanira* is numerous in the tropics of America but seems to be wanting everywhere else except in California.

### Melitaea, Type I.

1. *M. montana*, Behr. Syn? *M. Pyrrha*, Doubleday.

Alae supra aurantiacae, nigro clathratae, inter secundam et tertiam fasciam nigram magis dilutae; posticae inter primam et secundam fasciam, serie punctorum nigrorum signatae, fascia prima ab angulo anteriori interrupta, et costam versus quintam tantum denuo cursum ad angulum posteriorem recipiente.

Alae anticae subtus aurantiacae, disco fere concolori, nec maculis pallidioribus nec fasciis obscurioribus bene distinctis, apicem versus flavidae, maculis fasciisque fuscis, et prope angulum posteriorem macula nigra signatae. Alae posticae flavidae signaturis plus minus obscurioribus, in morem Argynnidum undulatis, serie punctorum brunneorum inter primam et secundam fasciam ut supra pertranseunte. Insuper inter costam quintam et sextam exstat lunula submarginalis pallidior, interdum candida pruinaque argentea induta, quam umbra amplectitur obscurior. Altera umbra a margine anteriori prope apicem extenditur.

This species is very variable as to the markings of the underside of the hind wings. Two specimens, which I received through the kindness of Mr Lorquin, have scarcely any markings there. These were collected in the neighborhood of Los Angeles. The others, received from the gentlemen of the survey, were mostly collected at the headwaters of Tuolumne River, but some from Yosemite Valley.

2. *M. collina*, Behr, n. sp.

Alae omnes supra fulvae, nigro clathratae, posticae inter fasciam primam et secundam serie punctorum nigrorum instructae.

Alae anticae subtus fulvae apicem versus gilvescentes, ubique signaturis fuscis, marginemque versus aliquot maculis nigris obsitae.

Alae posticae subtus gilvae, hinc pruina argentea indutae, signaturis fuscis in morem Argynnidum undulatis, binis semper per umbram quandam connexis, hinc et illinc confluentibus, serie punctorum nigrorum halone amplexorum ut supra inter fasciam primam et secundam pertranseunte. Lunula submarginalis inter costam quintam et sextam major quam reliquae lunulae submarginales, et umbra brunnea amplexa.

This species is not rare in the vicinity of San Francisco, and the hills of Contra Costa, especially on the grassy valleys, along creeks, and on hillsides with a varied vegetation of herbaceous plants. There must be many generations of these annually, for the perfect insect is found from spring to autumn.

3. *M. campestris*, Behr, n. sp.

Alae supra nigrae fasciis macularibus ochraceis et aurantiacis alternantibus. Series punctorum nigrorum in alis posticis in fascia aurantiaca submarginali.

Alae anticae subtus aurantiacae apicem versus luteae. Macula disci et fascia intermedia infracta luteae, haec intus nigro marginata. Alae posticae subtus luteae, linea transversa undulata divisae; A radice usque ad lineam transversam brunneo signatae et prope mediam lineam transversam umbra obscura indutae; quae umbra extenditur usque ad seriem punctorum. Lunula inter quintam costam et sextam candida, aucta et umbra amplexa.

This species is very common in different localities, especially on marshy places, where Hemizonia abounds. Seems to be peculiar to the lower regions, and produces several annual generations.

4. *M. pratensis*, Behr, n. sp.

Alae supra nigrae fasciis macularibus fulvis instructae. Maculae fasciae submarginalis alarum posticarum singulae singula puncta nigra gerentes.

Alae anticae subtus ochraceae maculis pallidioribus hinc et illinc signatae. Marginem versus posticam extant aliquot maculae nigrae. Alae posticae subtus hepaticae lineis undulatis, maculis, umbris serieque punctorum cunctis aeque brunneis instructae. Lunula submarginalis vix pallidior et umbra amplectente tantum e reliqua ala discerni potest.

This species is found on grassy hillsides and is common enough in some localities near San Francisco. Several generations are found from spring to the beginning of the rainy season.

Before I had a sufficient series of these nearly allied species in my possession, I considered them local varieties of one single species. Afterwards I had an idea that two of them, *M. collina* and *pratensis* might be seasonal varieties or alternating generations, like for instance *Arachnia Prorsa*, whose vernal generation *A. Levana* was for a long time considered another species. But according to my observations continued through several years, these species are not confined to certain seasons, but are to be found throughout the dry season. If they were alternating generations of the same insect the different forms would be found only at certain seasons; but such is not the case.

*M. montana* is very variable but never approaches to the characters of the other three species. The rest are as constant as a species can be, and in a long series of duplicates from different localities I do not find anything like an intermediate form.

The four species of this type agree in the following points:

1. A row of dots between the first and second transverse lines of the hindwings, in the space that represents in these species the submarginal fascia. This row is clearly visible on both sides.

2. The marginal lunula between the fifth and sixth vein is perceptibly augmented on both sides, and on the other side is frequently of lighter color and always surrounded by a deeper shade.

The most positive characters distinguishing the species is found on the disc of the underside of forewings.

1. *M. montana*, has the disc uniform fulvous the markings of the upper-side shining through the coloration of the disc.

2. *M. collina*, has the disc orange color; markings very perceptible and towards the exterior margin bordered by a series of black spots.

3. *M. campestris*, has the disc with a yellow spot between the first and second primary costa, and is bordered towards the exterior margin by an angular row of yellow spots, which are themselves bordered at the inner side by deep black.

4. *M. pratensis*, has the disc ochre yellow with irregularly diluted spots and some black marks near the *posterior* margin.

There are plenty of other points of difference, as may be seen by comparing the diagnoses. But for recognition of any of the species it is sufficient to examine the disc. The other differences are difficult to describe, as all those who know by their own experience the difficulties of analyzing the complicated markings of the underside of the hindwings in this group will testify. As to the larval state of these insects nothing is known, and this want of facts regarding their metamorphosis, is the more to be lamented as the natural affinities of this type are by no means very clear or simple. It seems to constitute a kind of intermediate group between the true *Melitæae* and the Arctic type of *Argynnides*. The eyes are more prominent than in the typical species of Melitæa, and I find a similar conformation of the head in *M. Tharos* from the Atlantic States. At the same time the underside of the hindwings of all these species does not represent the well-defined alternate bands of the typical *Melitæae*, but the intricate undulations and undefined lights and shadows of the underside of the Arctic type of *Argynnis*. In fact *M. montana* approaches in this respect very closely to *A. Aphirape*.

Type II. This type corresponds to the European type of *M. Athalia*, and even in the differential characters of the four species known to me there is a striking parallelism to those of four European species, so that each of them looks as if it was the transposition of a foreign species separated by a peculiarly Californian character, afterwards to be pointed out, from its European congener, and separated amongst themselves by the very same characters that separate the four European parallel species from each other. Their analogies are as follows:

| *California.* | *Europe.* |
|---|---|
| M. PALLA, | M. DICTYNNA, |
| M. WHITNEYI, | M. ATHALIA, |
| M. GABBII, | M. PARTHENIE, |
| M. HOFFMANNI, | M. ASTERIA. |

The Californians differ from their European analogues in the orange color that fills the space between the margin and the marginal line on the underside. In the European species this space always has the same pale tint that forms the ground color.

Then the two waving lines that inclose the submarginal band on the underside of the hind wings, are not entirely filled by the orange or fulvous spots as in the European, but have an empty space between the first and second, and the second and third veins.

1. *Melitæa Palla*, Boisd.

Alae maris supra fulvae nigro clathratae, feminae nigrae nonnullis fasciis macularibus gilvis instructae.

Alae posticae subtus gilvae lineis nigris et maculis aurantiacis ordinariis instructae, necnon serie lunularum fasciae submarginalis fulvarum a vena tertia inchoantium usque ad ultimam decurrentium. *Quaeque lunula continet ocellum.*

I repeat the diagnosis for the purpose of adding a character that has been hitherto overlooked but is essential for separating this species from the following. It is the eye-spot contained in each of the orange-colored spots of the submarginal band. It is true that these spots are not in every specimen equally visible, and often require the help of the glass to make them visible, but still they are never wanting as in the following species.

*M. Palla* is the only one of this type found in the vicinity of San Francisco, where it is rather common. Nevertheless I have not yet succeeded in finding the caterpillar, but have heard from our celebrated entemologist, Mr. Lorquin, that he has raised this butterfly from a caterpillar found on a species of *Plantago*.

2. *Melitaea Whitneyi*, Behr, n. sp.

Alae maris supra rubricantes nigro clathratae feminae, fere eædem, colore tantum dilutiori hinc et illinc paululum alternantes.

Alae posticae subtus iis *M. Pallae* similes sed *lunulae fasciae submarginalis ocellis omnino destitutae.*

At the first look the difference between this species and *M. Palla* is striking enough, for the coloration of the upperside is quite different and the reticulate black marking runs in much thinner lines and is more regular than in *M. Palla*, where towards the margin the black markings unite more or less and cover the ground color. The striking alteration in the colors of the upper side in the series of *M. Palla* does not exist here and the female is sometimes quite like the male. Sometimes the ground color alternates transversely with a slightly diluted tint, and for the female this character would be sufficient. But both sexes differ in the constant absence of the eye-spots of the submarginal band.

I received this species from the headwaters of the Tuolumne River where it was collected during the stay of the State Geological Survey in the elevated and uninhabited regions. I take this opportunity of showing my respect for Prof. Whitney and the other members of that learned party, to all of whom I am under obligations for the kindness with which, under all kinds of hardships, they collected materials for a Fauna of our Californian Lepidoptera.

3. *M. Gabbii*, Behr, n. sp.

Alae maris supra ut in *M. Palla*, feminae fasciis transversis alternantibus luteis et fulvis totae nigro clathratae.

Alae inferiores ut in *M. Palla*, sed maculae radicales candidae pruinaque argentea renitentes ita ut fascia intermedia lunulaeque marginales. Fasciae, maculae, et margo aurantiacae ordinariae. Fasciae submarginalis spatium, quae non occupatur lunulis aurantiacis, sulphureum.

I received this species from the mountains near Los Angeles and have seen a series of specimens constantly showing the same characters. This description I made from a pair kindly communicated to me by Mr. Lorquin.

4. *M. Hoffmanni*, Behr, n. sp.

Alae et maris et feminae a radice usque ad medium nigrae hinc et illinc maculis luteis fulvisque obsitae, a media ala luteae marginem versus fulvescentes plus minus nigro clathratae.

Alae inferiores subtus ut in *M. Palla*, sed fascia submarginalis inter lineas undulatas nigras, non lunulis sed punctis omnino rotundis constituta.

This species is less rare than the two preceding. Nevertheless it has not yet been found near San Francisco and seems peculiar to the higher regions of California.

### MELITÆA, Type III.

Of this type, we know already as many Californian as European species, but except *M. Phaeton*, I do not know any Eastern representative of this type. The most robust and gaily colored species belong to this type and it is one of the most predominant of the diurnal types in California, not only from the number of its species but also of its individuals.

1. *Melitæa Chalcedon*, Doubleday.

This showy species is very common around the Bay of San Francisco. The caterpillar is somewhat of the coloration of that of *Vanessa Antiopa*, but short and thick like all the *Melitæa* caterpillars and beset with short fleshy thorns. The dorsal row of spines is brick red and so is the lateral stripe above the feet. All other parts, both of the body and spines, are black, which tint, being thickly sprinkled with white dots has a bluish luster like the same tint in the caterpillar of *V. Antiopa*.

Most commonly this caterpillar is found on *Scrophularia*, but I have found it also on *Diplacus glutinosus* and on a *Lonicera*, related to *L. Caprifolium*.

The chrysalis is white with black and yellow dots. The butterfly is developed towards the end of April and is found until the end of June. There exists only one generation. The caterpillars grow very slowly through the summer. They are social and weave a kind of nest, in which they also hybernate. In spring their growth is quick enough, but they seem to be subject to much disease, and even in their natural state are frequently found half dried up. The butterfly also is often caught with crippled wings.

2. *M. Cooperi*, Behr, n. sp.

Alae supra ut *M. Chalcedontis*, subtus inferiores sulphureae fasciis et maculis ordinariis fuscis, maculis fasciae submarginalis *fuscis concoloribus, neque ullo halone cicumdatae.*

This species is very similar to *M. Chalcedon*, but the want of the yellowish halo around the lunulae of the brown band on the underside, is a very positive diagnostic character. The brown color of the bands also is always of the same somber hue as that of the underside of the forewings, and never of the fiery brick red that colors this fascia on the underside of *M. Chalcedon*, forming a perceptible contrast to the somber coloring of the underside of the forewings, which is the same in *M. Chalcedon* and *M. Cooperi*. With all these well-marked differences, the two species look so much alike, that it would have been a long time before *M. Cooperi* would have been recognized as a distinct species, if it had not been for the striking difference of its caterpillar, which was discovered by Mr. Lorquin near Clear Lake on a species of *Scrophularia*. This caterpillar is much more elongated than that of *Chalcedon*. It is nearly of the shape and coloration of that of the European *M. Artemis*, brimstone yellow, with a dorsal and a lateral black stripe. We were quite justified in expecting from such a caterpillar something strikingly different from the very common type of *Chalcedon*. But to our surprise our chrysalids gave us a series of crippled butterflies, which could scarcely be distinguished from *M. Chalcedon*. Since that time I have received a well-developed specimen through the kindness of Baron Koels, who caught it with several other insects on an excursion to Mount Tamal Pais.

It is pretty certain that *M. Cooperi* will be found in many other localities, as it is only its similarity to our most common vernal butterfly, the *M. Chalcedon*, that makes it escape our attention.

3. *M. Quino*, Behr, n. sp.

*M. Chalcedonti* similis sed antennae clava discolor, fusca nec concolor antennae reliquae aurantiacae.

Alae supra ut in *M. Chalcedonte* sed series macularum submarginalium in anticis rubra et marginalium in posticis flava rubro tincta. Series quarta in anticis bifida, fere tota rubra, tertia in posticis omnino rubra.

Alae inferiores subtus ut in *M. Chalcedonte* sed fascia flava prope radicem in maculas sex dissecta maculaque flava discalis puncto ejusdem coloris extus aucta.

*Melitæa Quino* may at once be distinguished by the entirely different and much gayer coloration of the upper side, which much more resembles that of

*M. Anicia* than *M. Chalcedon.* To the latter species it comes the nearest in the peculiar shape of the wings, so characteristically different in the two sexes. In *M. Anicia* this difference exists but not to the same degree. The yellow part of the underside of the hindwings is much paler than in *M. Chalcedon* and *M. Anicia.* The yellow radical band is dissolved into six distinct but nearly connected maculae. In *M. Chalcedon* the band is not interrupted and only the sixth macula is separated, making part of the yellow coloration of the anal side of the wing. From *M. Anicia* it differs besides, in the underside of the forewings being nearly all of a reddish-brown color with scarcely any indication of the markings of the upperside, closely resembling *M. Chalcedon.* From both species *M. Quino* differs in the coloration of the club of the antenna.

This species I received from Dr. Cooper, formerly of the State Geological Survey, who collected several specimens near San Diego. I have called it Quino in remembrance of the California Pioneer, Padre Quino, the first European that ever succeeded in erecting a permanent settlement in California, and at the same time contributed very considerably by his learned writings to a more exact knowledge of these then scarcely discovered regions.

4. *M. Anicia,* Doubleday.

This species seems to be restricted to the eastern and more elevated part of the State. Most of my specimens are from Mariposa.

5. *M. nubigena,* Behr, n. sp.

*M. Aniciae* similis sed antennarum clava nigrescens, et subtus in alis posticis fasciae pallidae intermediae bipartitae pars exterior aurantiaca, ut fascia lunularum quae sequitur eam.

This species was caught in considerable numbers by Mr. Hoffman at the headwaters of the Tuolumne River and beyond, up to elevations of 11,500 feet. It evidently stands in the same relation to *M. Anicia* as in Europe *M. Merope* does to *M. Artemis.* I am not certain if *M. nubigena* is to be considered an alpine variety of *M. Anicia* or an independent species, nor as far as I know is the question yet decided as to the right to distinction of *M. Merope,* a long-known alpine insect of Europe. Nevertheless, considering the different coloration of the antenna club, I am very much inclined to think *M. nubigena* more than a mere alpine variety.

6. *M. Editha,* Boisd.

This species is found in different localities near San Francisco and Contra Costa. Nevertheless, it is much rarer than *M. Chalcedon* and of a more restless disposition. It makes its appearance before *M. Chalcedon* and is one of our first vernal butterflies. About the caterpillar I have not yet succeeded in ascertaining anything.

### MELITÆA, Type IV.

Of this type only one Californian species is yet known, but there may be perhaps some other species in the southern parts of the State, as the subtropical territory of New Mexico seems rather to abound in this type.

1. *M. Leanira,* Boisd. (In litteris.)

Antennae totae fulvae.

Alae supra nigrae, fasciis macularibus duabus et radicem versus maculis tribus quadrangularibus omnibus gilvescentibus instructae. Alae anticae prope marginem anticam, apicem versus et ad marginem externam mediam, e nigro rubescentes.

Alae anticae subtus rubrae iisdem maculis ut supra ornatae. Fascia macularis externa extus nigro marginata. Alae posticae subtus gilvescentes nigro venosae, et nigro marginatae, radicem versus nigro signatae; supra medium fascia nigra instructae, catenam moniliformem continente punctorum gilvorum.

Limbus ubique et supra et subtus nigro alboque variegatus.

*M. Leanira* is so distinct from all other *Melitæae*, that it is impossible to make any error in reference to its diagnosis. It is found in June and July in valleys of the Contra Costa hills, where I collected it myself. I received other specimens from Yosemite Valley. I have not succeeded in finding the caterpillar.

I have to add a few observations regarding the geographical distribution of the genus *Melitæa* in general and of its different types separately.

The genus *Melitæa* spreads from the Arctic zone to the tropic of Cancer and some mountain species even farther. Unlike the genus *Argynnis* in its geographical distribution *Melitæa* has no Antarctic species. It has its center of abundance in the temperate zone and decreases towards the tropics as well as the arctic zone. According to that peculiarity of the western slope of continents by which the temperate zone is more developed in extent and quality, than in the eastern slopes, the greatest number of species are found in Europe and on our coast. Eastern Asia has very few species, but the genus is better represented on the Atlantic side of this continent, where however, it appears in the aberrant forms of *M. Tharos*, *M. Pyrrha*, etc, whose real nature seems still doubtful and which are at least intermediate between *Argynnis* and *Melitæa*.

The genuine type is very uniform, and therefore the diagnosis of the Californian as well as the European species is enveloped in many difficulties, so that even in regard to many European species known and described for more than a century, the limits of the species are frequently more or less doubtful and nearly every Catalogue gives the series of closely allied species in a different form.

California possesses two types wanting to the European Fauna; Europe one type wanting to California. To us the type of *M. Cinxia* is wanting, to Europe that most characteristic form of *M. Leanira*, which is a very natural transition to the genus *Synchloe*. The other wanting to the old world is that of *M. Pyrrha*, an osculant form peculiar to the new world where it extends nearly as far as the equator.

As regards the development of the genus in size and brilliancy of color, the Californians have a decided advantage. The giants of the genus are all Californian and the coloration more bright and more distinct than the somber hues of their less-developed European allies.

Like the Argynnides the Melitææ are essentially local. There is no Amphigeic species, and even the Polar species (which in Argynnis are sometimes Amphigeic) are always different in this genus, never occurring both in Europe and America. In the same way the Atlantic and Pacific species seem always to differ.

These butterflies not having a very powerful flight are generally confined to circumscribed localities, in which they are generally plentiful and easily collected. Their caterpillars are frequently social like those of the *Vanessae*, preferring the family of Scrophalarineous plants, (*Scrophularia* in California, *Linaria* and *Veronica* in Europe), but inclined more to polyphagy than the Argynnides, in their predilection for the Violarineae. Besides the Scrophalarineae the *Melitaae* live on *Plantago*, *Lonicera*, *Scabiosa*, and some even are found on shrubby trees of *Salix*, *Populus*, and *Fagus*.

Dr. Cooper presented a continuation of his descriptions of fishes:

## On new Genera and Species of Californian Fishes—No. II.

BY J. G. COOPER, M. D.

### EXOCŒTUS, ARTEDI.

E. CALIFORNICUS, Cooper, Californian Flying-Fish, State collection, species 1012. [Fig. 20.]

*Specific characters.*—Height of body one eighth of its length from tip of nose to fork of tail, length of head almost one fifth of the same (0·19). Width of forehead in front of eyes more than five eighths the length of head (0·69); diameter of eye less than one third of same length (0·30). Scale between eyes equilateral, and a little less than half of the width of head. No granulated area in front of orbit, and but a very narrow one behind it. Preoperculum rounded rectangular. Pectoral fin extending to halfway between end of dorsal and base of caudal, 0·60 of total length. Ventrals inserted nearer operculum than base of caudal, and extending to middle of anal. Dorsal commencing over 36th scale and extending to 48th.

D. 12, P. 14, V. 6, A. 10, C. 3-1-4-5-1-6. Scales 58 $\frac{7}{1}$.

*Colors.*—Steel-blue, fins smoky, below silvery, iris gilt.

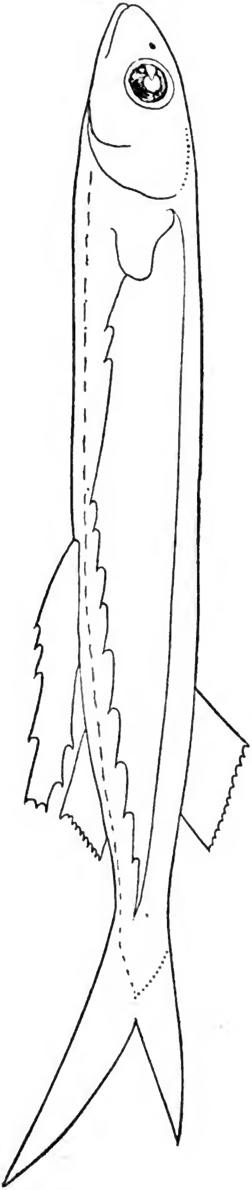
*General form* much elongated, subcylindrical. Top of head perfectly flat, its width equal to its depth. Anterior half of body nearly as broad as high, compressed above. Posterior half compressed laterally, tapering to tail, the caudal peduncle three times as high as it is broad. A slight ridge along insertion of dorsal. Lateral line prominent, running close to insertion of ventrals. Proportions of fins to total length, as follows:

| | |
|---|---|
| Length of dorsal | 0·11 |
| Height of ventrals | 0·23 |
| Length of anal | 0·07 |
| Length of caudal, upper lobe | 0·15 |
| Length of caudal, lower lobe | 0·22 |
| Height of pectoral | 0·60 |

Length of specimen fifteen inches, the figure representing it half the natural size. One specimen obtained at Catalina Island.

REMARKS.—In the preceding diagnosis I have followed the arrangement of specific characters adopted by Gill in his description of two new species of *Exocœtus* from the Pacific Coast of Central America. (Proc. Acad. Phil.,

FIG. 20.



June, 1863, p. 167.) By comparison it will be seen that our species is very distinct.

This large species of Flying-Fish is found in great numbers during the summer south of Point Conception, and some wander as far north as Santa Cruz at least. They can only be taken when they happen to alight on board of a vessel or in gill-nets, which I was not provided with during my late voyage among the islands. Their flight is rarely higher than ten feet above the water, but sometimes extends nearly a quarter of a mile.

### UROLOPHUS, Müller and Henle.

UROLOPHUS HALLERI, Cooper, State collection, species 522. [Fig. 21.]

*Specific characters.*—Disk suborbicular, obtusely pointed in front, and with the pectoral fins rounded behind. Length anterior to anus a little greater than that of the tail behind it. Posterior outline of ventral fins projecting a little behind that of disk. Claspers as long as ventrals and projecting entirely behind them. Tail 0·47 of total length, gradually tapering from a cylindrical base to the spine, thence becoming flattened laterally expanding into a fin, which commences opposite the base of spine below, and ends opposite to its end above, broadest near its end, where its width is 0·10 the length of tail. Spiracles a little larger than orbits and farther apart, the distance between them equal to that from snout to orbits. Ventrals forming nearly equilateral triangles, their basal length one fifth that of head and body. Caudal spine arising at 0·48 of the length of tail, and not quite one third as long. Female more elongated than male but tail and spine shorter; the ventrals a fourth longer and more acute.

*Colors.*—Reddish speckled with yellow, below white. In some specimens the dark and light colors above are about equally distributed, the spots having a somewhat marbled arrangement. In others the light spots are very few and widely separated. Popular name "Round Stingray." The figure is half the natural size. The dots show the principal outlines of the cartilaginous skeleton.

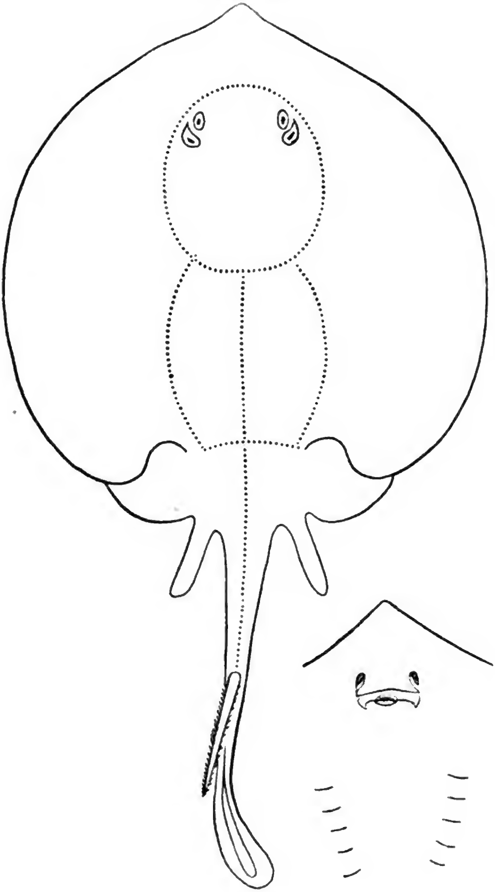
REMARKS.—While this fish has the nearly orbicular outline of *Urotrygon* (*mundus*), Gill, from Panama (Proc. Phil. Acad., June, 1863, p. 173), it differs generically in having obtusely triangular teeth (equilateral), tail shorter than body, spine nearest to its base, smooth skin, etc.

It differs from *Urolophus*, as described by Richardson, in the upper velum of mouth being entire, and in having about twenty small tubercles on the surface of lower velum. These however can scarcely be considered generic differences.

Found abundantly in muddy creeks at San Pedro and San Diego, those from the former place being more uniform in color.

While I was at San Diego the little son of Major G. O. Haller, U. S. A. was wounded in the foot, probably by one of these fish, while wading along a muddy shore of the bay. The wound was very painful for some hours, though small. Another large rhomboidal species also abundant there but apparently still undescribed, inflicts very severe and dangerous wounds, of which I may have more to say hereafter.

FIG. 21.



This fish has great muscular power and can dart very rapidly through the water by lateral vibrations of its tail, at the same time quickly flapping the edge of its disk, to keep its level in the water and to regulate its direction.

It frequently buries itself slightly under the mud, and if disturbed obscures the water by stirring the mud, vanishing in the cloud thus raised to hide itself again. It will allow a boat to pass over its place of concealment, and may, if detected, be easily killed by a blow with the end of an oar. Many are also caught in the seines of the fishermen.

Their food consists of small mollusca, crustacea and such other animals, alive or dead, as they can obtain.

### REGULAR MEETING, DECEMBER 7th, 1863.

President in the Chair.

Present, ten members.

Donations to Cabinet:

Rock Salt, from the Upper Colorado River, by F. Alling. Wood, from near Carson City.

Dr. Cooper stated that he had received a communication from Mr. P. P. Carpenter, of England, offering to describe any new species of shells from the collections of the State Geological Survey or of the Academy, and to publish the descriptions in its proceedings. The Society accepted the proposition.

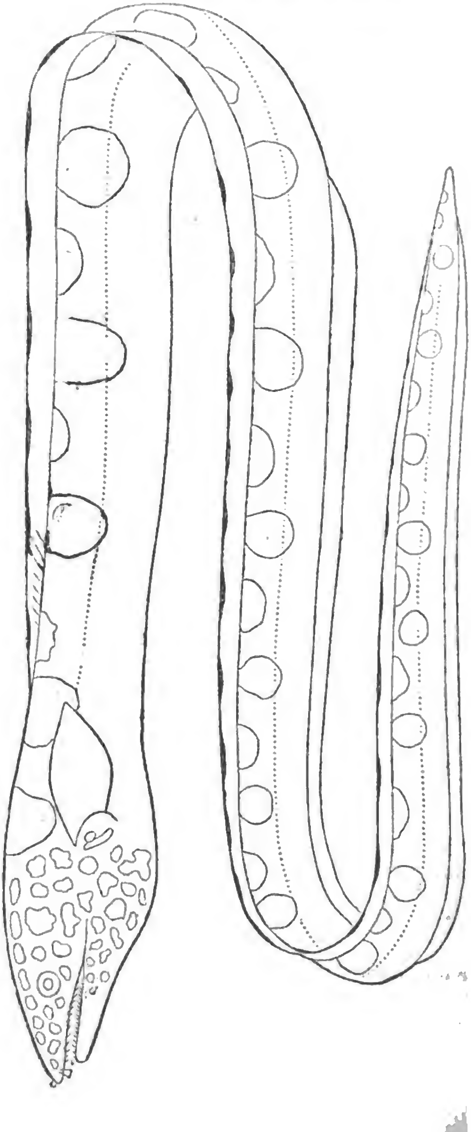
Two new sheets of the Proceedings were laid upon the table.

### REGULAR MEETING, DECEMBER 21st, 1863.

President in the Chair.

Present, seven members.

Messrs. Royal Fisk and R. L. D'Aumaile were elected resident members.



OPHISURUS CALIFORNIENSIS—Garrett. [Described on p. 66 of this volume.]

### ANNUAL MEETING, JANUARY 4th, 1864.

President in the Chair.

Fifteen members present.

E. Mathewson, Esq., of Martinez, was elected resident member.

The following is an abstract of the Annual Reports of the officers of the Society, for the past year (1863):

The Financial Report of the Trustees was received and accepted. During the year, $815 35 have been received from various sources, besides the balance on hand from 1862, of $141 22; $903 75 expended; and $52 82 remains in the hands of the Treasurer.

The Librarian (Prof. Whitney) reported verbally, that about fifty volumes have been added to the Library, mostly the publications of other Societies; that some sets of Journals have been rendered complete, by his own donations, and that the volumes of the "American Journal of Science" have been bound.

The Curator of Mineralogy (Mr. Moore) reports, that the collection is in nearly the same condition that it was at the commencement of the last year, that but few additions have been made, and that the work of cataloguing and classifying the specimens is in progress.

The Curator of Palæontology (Mr. Gabb) made no report.

The Curator of Botany (Dr. Kellogg) reports, that some additions have been made; that the collections are not in good condition for want of suitable cases, and recommends that new cases be procured, and that a suite of the specimens described by members of the Society be sent East, for comparison with specimens in those herbariums to which we have no access.

The Curator of Zoology (Dr. Cooper) made a verbal report, that he has been absent the most of the year, and that the collection has not materially changed since the last report, with the exception of an interesting collection of Birds deposited by Mr. Holder.

The Curator of Conchology (Dr. Trask) reported verbally, that about three hundred species of shells have been added to the collection during the year. Also, that he had received from Mr. Andrew Garrett, a collection of one hundred and fifteen species of Hawaiian Fishes, for the Museum.

The Curator of Entomology (Dr. Behr) reported verbally, that there have been no contributions, but that he will contribute from his own collection, and other persons have expressed their desire to do likewise, when the Society shall possess the means of accommodating and preserving the specimens.

The officers of the preceding year were reëlected, with the exception of Treasurer—S. Hubbard being elected in the place of Wm. Heffley, resigned.

The following resolution, prepared by Dr. Ayres, was unanimously adopted:

*Resolved*, That hereafter the Proceedings of the Academy be distributed gratuitously only to resident members and to such Societies and individuals as the Academy shall direct; and that the price of subscription to others be regulated by the Publishing Committee.

The Society authorized the publication of the following Constitutional amendments, adopted at the annual meeting, January 6th, 1862, the publication of which was accidentally omitted in the Proceedings of that year:

Amendment to Art. II, Sec. 4—That the Membership Fee, to be paid by an applicant for Resident membership, shall be two dollars, etc.—the remainder of the section remaining as before.

Amendment to Art. III, Sec. 2—This Association shall hold meetings on the First and Third Monday evenings of each month, for the investigation of Natural History, etc.—the remainder of the section remaining as before.

Dr. Ayres read extracts from letters containing inquiries in regard to the first volume of the Proceedings of the Society, which terminated abruptly, and was never finished. The supply has long been exhausted, and the republication has been frequently discussed; but as yet this is beyond the means of the Society.

Prof. Brewer communicated the following paper by Prof. Gray, giving the first installment of a series of descriptions of new plants from the botanical collections made by himself, while engaged in the State Geological Survey. These are a portion of the new species collected previous to 1863. The remainder will be described in future papers, along with those from the collection made after that time.

## Descriptions of New Californian Plants—No. I.

BY PROF. ASA GRAY.

### STREPTANTHUS Nutt.

*S. Breweri,* n. sp. [§ Euclisia.]

Wholly glabrous and glaucous, annual, branched from near the base; cauline leaves (except the lowest) strongly cordate-clasping, with a closed sinus, entire or denticulate, the uppermost sagittate; flowers purple, on very short ascending pedicels, the lowest often leafy-bracted; the buds often a quarter of an inch long, obtuse, or barely acute; the sepals with scarious but blunt recurved tips; siliques narrowly linear, ascending or erect, straight or slightly incurved (1½—2½ inches long, less than a line wide,) compressed but torulose, the nerve of the valves obscure; seeds wholly marginless.

This most resembles *S. tortuosus Kellogg* (which is S. *cordatus Torr.*, in *Bot. Pacif. R. R. Whipple's Rep.* but evidently not of *Nuttall*), from which the above character indicates the differences.

There are three forms in the collection: 1. A dwarf state, in flower only, from Mt. Shasta, at an altitude of 8,000 feet. 2. A very glaucous form, with more numerous and rather smaller flowers, and with fruit, from the top of a dry mountain of the Mt. Diablo Range, near head of Arroyo del Puerto, at an altitude of 3,200 feet. 3. Another, in flower and fruit, with more naked and virgate branches, a foot or two in height, from San Carlos Mountain, near New Idria, 5,000 feet altitude. This is remarkable for having the calyx hoary-downy, but the plant is otherwise glabrous and glaucous.

*S. hispidus,* n. sp. (§ Euclisia.)

Very dwarf, (2–3 inches high, from an annual root,) hispid throughout, even to the siliques; leaves cuneate or obovate-oblong, coarsely toothed or incised, the cauline-sessile but hardly at all clasping; raceme short and loosely flowered; pedicels spreading or at length recurved in flower (which is red or red-violet) but the linear compressed siliques (1½ inch long, a line wide,) are erect; stigma almost sessile; immature seeds winged.

Mt. Diablo, dry places near summit.

This ranks next to *S. heterophyllus.*

### VIOLA L.

*V. ocellata,* Torr. and Gray, *var.*

Glabrous, smaller; leaves somewhat thickish; peduncles elongated. Very curious and distinct. From Tamalpais.

### ARENARIA L.

*A. brevifolia* Nutt.? *var. Californica.*

Much branched or diffuse, cymosely many-flowered; petals and sepals somewhat narrower.

Leaves as in Nuttall's plant, thickish, plane, mostly obtuse and spreading Valves of the capsule entire. Filaments opposite and twice the length of the sepals, more dilated and glandular at the base. Seeds minute, minutely muricate, turgid. The fruit and seed are known only from Fremont's specimens communicated to Dr. Torrey (No. 284 of Coll. 1846,) from California, a taller and less diffuse form than that now collected by Prof. Brewer, and more like Nuttall's, from Tatnall County, Georgia. But my original specimen of the latter little-known plant is too incomplete to make certain the identity; and the two are widely sundered in geographical station. Still no adequate characters yet appear to distinguish specifically. Prof. Brewer collected his plant April 18th, in the valleys among high ridges in Sonoma, where it abounded.

### CALANDRINIA H. B. & K.

### *C. Menziesii*, Hook.

In various forms in southern California. Capsule slightly if at all exceeding the calyx; seeds rather turgid, shining; petals mostly much exceeding the calyx.

### *C. Menziesii, var. macrocarpa.*

Stems and racemes at length more elongated and loosely-leaved; pedicels in fruit much spreading or recurved; capsule ovoid-fusiform, projecting beyond the calyx; seeds smaller, compressed and opaque.

Dry hills of the Santa Inez mountains, near Santa Barbara.

Perhaps a distinct species, but I want to see it confirmed by other specimens.

### LINUM L.

### *L. Breweri*, n. sp.

Annual; glabrous; stem very small, not striate, with few flowers crowded at the apex; leaves filiform, smooth, alternate and opposite; stipules conspicuously glandular; pedicels shorter than the calyx; sepals oblong-ovate, acute, one-nerved, margin not scarious, glandular, less than half as long as the bright yellow, obovate-oblong petals; anthers elongated-oblong; sterile filaments almost wanting; styles three, distinct; stigma somewhat acutely pointed.

Dry hill sides of the Diablo Range, near Marsh's Ranch, May 29th.

Plant barely two to three inches high, "but seen in the valley larger, with many flowers, not yet expanded."

This, like *L. Californicum*, appears to be uniformly tri-carpellary; flowers about the size of those of that species, and the anthers elongated-oblong; but the leaves narrower; the stigmas not at all capitate or enlarged, but minute and acute; fruit not seen.

### TRIFOLIUM, L.

### *T. bifidum*, n. sp.

Somewhat villose or glabrous; stems from small (annual?) root, slender, spreading; stipules ovate-lanceolate, setaceously-acuminate, entire; leaflets linear-cuneate, lateral ones rarely dentate, bifid or incised at the apex with a mucronate point between the lobes; peduncles twice or three times as long as the leaves; heads naked, six to twelve flowered, or more; flowers pedicelled, at length reflexed; calyx five-parted, dentate, subulate-setaceous, somewhat hirsute, and nearly equal to the persistent, rose-colored scarious corolla.

Near Marsh's Ranch, between Monte Diablo and the San Joaquin, among grass in a ravine near the water, May 29th.

Stems six to sixteen inches long. Heads and flowers about the size of those of the small form of *T. gracilentum*, to which species it is allied. Ovary two-ovulate, seeds single.

### ASTRAGALUS L.

*A. curtipes*, n. sp. (§ Phaca, * Inflati.)

Minutely canescent, at length glabrate, a foot high; stipules connate, opposite the leaf; leaflets twelve to sixteen pairs narrowly oblong, retuse petiolulate, glabrous above; raceme in fruit short; calyx-teeth slender, subulate, slightly shorter than the campanulate tube; legume membranaceous, inflated, glabrate (1½ inches long,) semi-ovoid, (the ventral suture nearly straight, the dorsal very gibbous,) scarcely acute at either end, jointed to a rigid stipe, which does not exceed the tube of the calyx.

Dry hill sides, San Luis Obispo. Corolla not seen.

*A. oxyphysus*, n. sp. (§ Phaca, * Inflati.)

Tall, very softly canescen-villous; stipules small, scarious, distinct; leaflets 8–11 pairs, oblong; peduncles much surpassing the leaf; raceme elongated; bracts small and subulate; teeth of the silky calyx subulate, half the length of the cylindraceous tube; corolla white or greenish; legume obovate-acuminate, the base attenuate into a recurved stipe which somewhat exceeds the calyx.

Monte Diablo Range, near Arroyo Puerto, on dry hills.

A most distinct and striking new species.

*A. Breweri*, n. sp.

Aliled to *A. tener* Gray, Rev. Astrag. (*Phaca astragalina, var.?* Hook. and Arn., and probably *A. hypoglottis, var. strigosa*, Kellogg,) but more branched from the annual root, and with broader leaflets, (4–5 pairs, oblong-obcordate); head 5–7 flowered, compact; immature legume globose-ovate, silky-canescent, not stipulate, erect, six-ovulate, one-celled, the dorsal suture slightly intruded.

Fields in Sonoma Valley, April. Common.

Dr. Ayres read letters from Mr. A. Garrett, and presented the following paper:

## Descriptions of New Species of Fishes—No. II.

BY ANDREW GARRETT, OF HONOLULU, SANDWICH ISLANDS.

### CHEILODACTYLUS Lacep. 1803.

*C. vittatus* Garrett.

B. 6; D. 17-30; A. 3-8; V. 1-5; P. 8-6; C. 5, 1, 7, 6, 1, 4.

The height of the body is a trifle less than one-third of the total length. The upper profile rises in a convex line from the snout to the occipital region, whence it suddenly ascends in a nearly vertical curve, giving that portion of the fish a strongly gibbous appearance. The body rapidly tapers posteriorly, though preserving a slightly convex outline. The head enters nearly four and a half times in the entire length. The eyes are large, sub-circular in shape, even with the line of profile, and their greatest diameter is nearly one-third the length of the head. They are placed nearer the origin of the lateral line than the end of the snout. The small maxillary bone extends as far back as the anterior margin of the eye.

The dorsal fin takes its origin immediately above the posterior limb of the orbit and terminates within one diameter of the eye of the caudal fin. Its three anterior rays are very small, and the fourth, which is the tallest, is one-third as long as the base of the whole fin, or equal to two-thirds the height of the body. Posteriorly the spiny rays rapidly diminish in altitude so that the last one is shorter than the succeeding soft rays. The soft portion of the fin is comparatively low, gently convex along its upper edge, and is equally as long as the spiny part. The anal fin is small, being inserted just in advance of the middle of the soft portion of the dorsal. Its extreme margin is slightly concave and the rays rapidly diminish in length posteriorly. The ventrals when laid back reach as far as the anal fin. The second simple pectoral ray extends as far back as the vent. The caudal, which is deeply forked, has its lobes rounded off.

Color greyish-silvery, and ornamented with five oblique blackish-brown bands which are disposed as follows: one extends from the snout to the preopercular margin, the second starts from the eye and terminates on the pectoral base, the third, which passes over the occipital region, extends below the pectoral axilla; the fourth, which is much broader, starts from the origin of the dorsal fin, curves downward and backward, becoming wider in its descent, and passes beneath the abdomen; the fifth one commences on the upper anterior half of the spiny dorsal, extending along the back to near the termination of that fin. Three irregular, pale spots may be observed in the dorsal band, and three large blackish-brown spots on the caudal trunk. The opercular flap and snout tinged with orange-red. The interorbital space is marked with two transverse brownish-red bands. Irides yellowish-silvery. That portion of the dorsal fin anterior to the fifth band is white, the remainder, together with the anal and caudal, light-yellowish, the latter tipped with blackish-brown. The pectorals are orange-red, and the ventrals are deep blackish-brown.

Length, 7 inches.

Habitat, Sandwich Islands.

REMARKS.—An extremely rare fish, of which the solitary specimen now before me is the only example that has come to my notice. It is the more interesting in a geographical point of view, as being the only species—as near as I can ascertain—recorded from the Polynesian Seas. Sir John Richardson, in his interesting "Notices of Australian Fish," published in the "Proceedings of the Zoological Society of London," describes, and gives a list of thirteen species. Nine of those occur in the Australian Seas, one from China and Japan, two from the Cape of Good Hope, and one from Tristan d'Acunha. In the number and arrangement of the fasciae, our fish closely resembles the *C. gibbosus*, Sol., (*Chaetodon*) from Van Diemen's Land. The latter species is less gibbous, the eyes smaller, the soft portion of the dorsal fin shorter, and the caudal forks are more pointed than in the *C. vittatus*.

### APOGON Lacep. 1802.

### *A. maculiferus*, Garrett.

B. 7; D. 7-1-9; A. 2-8 V. 1-5; P. 13; C. 4, 1, 8, 7, 1, 3.

The upper profile of the head is slightly concave; otherwise the general shape of the fish closely resembles the *Apogon fraenatus*, Val. The greatest depth of the body, taken at the commencement of the anterior dorsal fin, equals the length of the head, or two-sevenths of the entire length of the fish. The eye is large, sub-circular in shape, even with the upper line of profile, and its diameter nearly one-third as long as the head. The upper jaw is slightly the longest, and the hinder termination of the maxillary is on a line with the posterior border of the pupil. The margin of the preopercle is finely and regularly dentated, and its anterior crest or ridge exhibits but few irregular teeth. The lateral line may be traced over twenty-four scales.

The first and second dorsal fin are of equal length along their base, both being higher than long, and the altitude of the latter, which exceeds that of the former, is, as compared to the entire length of the fish, one to five. The anal fin is inserted a trifle more posterior than the fin above. The large ventrals, when laid back, cover the vent with their tips. The caudal is sub-bifurcate.

Color brilliant silvery, with an iridescent reflection in which carnation predominates. The upper two-thirds of the body is ornamented with longitudinal rows of small olivaceous spots, one on each scale, and those above the lateral line more or less coalescing, forming broken bands. The head, which is more or less tinged with diluted carmine-red, is marked by a diffuse olivaceous band, which extends from the end of the snout, passing through the eye and terminating on the opercle. Irides silvery white; cornea black. The membranes of all the fins are tinged with orange-yellow, and their rays are red.

Length, 5½ inches.

Habitat, Sandwich Islands.

Vernacular, "Upapalu."

REMARKS.—The longitudinal series of maculations will readily determine this species. Under the lens the spots assume the appearance of clusters of minute dots, some of which have blue central points.

### SCORPÆNA Artedi, (L.)

### *S. parvipinnis*, Garrett.

D. 13·10; A. 3-5; V. 1-5; P. 7-9; C. 5, 1, 6, 5, 1, 3.

In this species the upper and lower outlines are quite similar, being gently arched. The greatest depth of the body falls slightly short of one-third of the total length, and the greatest thickness at the base of the head, is a little more than two-thirds of the above mentioned depth. The head constitutes just one-third of the whole fish. The eye is large, circular, its diameter being nearly one-fourth of the length of the head. Four spines may be seen along the upper edge of the orbit, and the same number on each side of the occipital region and nape, the posterior one the larger. Two intraorbital spines, one on the nasal bone, and a longitudinal row of four along the supratympanic region. Two on the opercle, the lower one long and projecting posterior to the margin of that bone. A stout one may be observed on the humeral region, one on the infraorbital, three on the margin of the preopercle, and a longitudinal row of irregularly disposed ones along the cheek. The lower jaw is slightly longer than the upper, and the tip of the maxillary extends as far back as the hinder border of the eye. Fine scales envelop the basal portions of all the fins except the ventrals, and cover all parts of the head except the jaws and the lower half of the maxillary bone. Minute filaments are observed on all parts of the fish, being more numerous on the upper anterior third of the body. The dorsal and anal fins are small, the former commencing above the origin of the latter line. The spiny portion of the dorsal is very low, gently arched, and constitutes nearly two-thirds of the fin. The soft portion of the anal fin is very narrow and rounded off.

The head and anterior half of the body is greyish, passing into light carnation beneath, and obscurely clouded with dusky. The posterior half of the body is dusky black, which fades into pink beneath, maculated with small darker spots. Caudal trunk, pink. Two large dusky black spots on the anterior dorsal region. Irides greenish-yellow. Fins pinky-red, the spiny dorsal mottled with dusky, and the other fins dotted with pinky-brown, and a bar of the same color on the caudal base.

Length, 4 inches.

Habitat, Sandwich Islands.

REMARKS.—The scaly head, small dorsal and anal fin will readily distinguish this beautiful species.

### CRENILABRUS, Cuv.

### *C. modestus*, Garrett.

B. 6; D. 12-10; A. 3-12; V. 1-5; P. 17; C. 2, 1, 6, 6, 1, 2.

The greatest depth, which occurs beneath the origin of the dorsal fin, is about one-fourth of the total length, and the greatest thickness is just half of the above mentioned depth. The head, which comprises a little more than one-fourth of the whole fish, presents a slight concave depression above the eyes. The preopercular serrations are very small. The eyes are sub-circular, their greatest diameter entering nearly six times in the length of the head, and twice in advance of their own orbit. The hinder tip of the maxillary reaches a vertical, passing through the center of the eye. Twelve longitudinal rows of scales may be enumerated between the lateral line and the vent, ten rows on the side of the caudal trunk, and the median longitudinal row on the body contains thirty scales. The lateral line, which passes over thirty-three scales, consists of slightly branched tubes.

The dorsal fin extends over a base equal to half the length of the fish, caudal fin excluded. Its soft portion falls slightly short of one-third of the whole fin. The anal fin, which is nearly half as long as the dorsal, has its hinder termination slightly more posterior. The acuminately pointed ventrals, when closely appressed to the abdomen nearly reach the anal fin. The large caudal has its posterior upper and lower angles considerably prolonged and pointed.

Color purplish-brown, passing into bluish grey beneath, and obsoletely lineated longitudinally with darker. A large oblong pale diffuse spot beneath the posterior end of the dorsal fin, which is directed obliquely downward and forward. Irides silvery, tinged with yellow. The dorsal fin is pale greyish, marked anteriorly with a large diffuse blue-black spot, its soft portion being tinged with reddish and margined above with yellow. The anal, ventrals and caudal are bluish-grey, the former posteriorly tinged with faded red and edged with yellow. Pectorals nearly colorless.

Length, 18 inches.

Habitat, Sandwich Islands.

Remarks.—We have obtained only two individuals of this large species, both of which were exposed for sale in the Honolulu fish-market. The colors, which are no doubt considerably changed, were taken from the dead fish.

### Chironectes Cuv. 1817.

### *C. niger*, Garrett.

D. 3-12; A. 6; V. 5; P. 10; C. 1, 7. 1.

The head constitutes about one-third of the total length, caudal excluded. The eyes are elliptically-oval, and inserted just once their greatest diameter distant from the margin of the upper jaw. The skin is covered with fine closely set prickly asperities, which gives it a velvety appearance. The general outline is ovate, and the greatest thickness equals one-sixth of the entire length. A range of conspicuous pores commences on the upper part of the gill covers, curving downward and upward to the symphysis of the lower jaw. Another row follows the margin of the upper jaw, passing over the snout, where it branches off posteriorly, curving over the eye and disappearing on the posterior portion of the body. Each pore is encircled with brush-like appendages, which gives them a tufted appearance. The dorsal fin extends over a base equal to one-third the length of the fish. Its upper margin is arched, and its height as compared to length is as one to two. The height and length of the anal fin are about equal.

Color deep black and obsoletely maculated with rather small roundish darker spots. On the basal portion of the dorsal and anal fins may be observed two large ocellations, with deep black pupils and paler areolae. Very minute opaque white points may also be seen scattered along the lower parts. Eyes blackish.

Length, 3½ inches.

Habitat, Sandwich Islands.

Remarks.—This species possesses the nasal tufted bristle and two horn-like processes that we observe in all the species inhabiting these seas. When handled it emits a most disagreeable odor.

Dr. J. G. Cooper presented the following paper:

# On New Genera and Species of Californian Fishes—No. III.

BY J. G. COOPER, M. D.

### MYXODES Cuvier, 1817.

*M. elegans*, Cooper, State Collection, No. 707. [Fig. 23.]

*Specific characters.*—Form elongated, high and narrow, the head wider than the thickest part of body. Length of snout equal to diameter of eye, lower jaw very slightly longest. Total length a little more than four and a half times that of head, which is equal to the greatest height of body. Head moderately arched, rounded above, the width between eyes a little less than the width of orbit. Orbit circular, contained four and a half times in length of head. Anterior lobe of dorsal commencing just behind head, triangular, one-twentieth of the length of fin, equal to the middle lobe in height; middle lobe gradually arched, its spines more slender than those of the first lobe; posterior lobe with soft rays only, about equal to the first, in size and form, extending nearly to the tail. Caudal fin quadrangular, its end obtusely truncate, nearly twice as long as wide. Anal commencing opposite seventeenth dorsal spine, nearly straight, its height one-fifth its length, and ending a little anterior to end of dorsal. Ventrals narrow, the middle ray longest. Pectorals arising opposite third dorsal spine, nearly as wide as long.

D. V–xxvii to xxx–8; C. 5–5; A. 26 to 28; V. 3; P. 11.

Scales in about 250 rows along middle of side, in $\frac{18}{50}$—$\frac{15}{18}$ vertical rows along lateral line. Proportional measurements:

| | |
|---|---|
| Length of largest specimen, 4 in | 100. |
| Length of head | .20 |
| Height of pectoral | .15 |
| Length of dorsal | .72 |
| Length of caudal | .12 |
| Length of anal | .44 |
| Height of ventral | .09 |
| Height of body | .22 |
| Width of body | .08 |

*Colors.*—Exceedingly variable, but the general pattern, as preserved in alcohol, consists of a series of vertical bands, alternating with spots of various shapes and sizes, and often densely mottled with dark and light blotches distributed regularly, but not describable. The fins have alternating bands, and in all the specimens the membrane between the third and fourth dorsal spine is as clear as glass, as if intended to be seen through, but probably shines in the water as a sort of signal. When fresh the colors of those from San Diego were as follows: 1st, dark brown, a purple lateral stripe, sides with dark and light brown bars, having silvery blotches between them; below yellowish, top and sides of head blotched with yellow, a bright red ring with a green centre near pectorals, and another near caudal. Dorsal with alternating bars of olive and yellow; pectoral yellow at base, its rays reddish, barred with purple, ventrals and anal smoky.

Another was striped and cross-barred with brown, and mingled with this pattern were blotches of olive-brown, yellowish and purple, but no rings. Fins marked like the body, but paler.

It is possible that the rings observed in the first one, and not seen in any other, were caused by the growth of vegetable parasites, which are often found on fish of similar habits.

REMARKS.—This is the first instance of a *Myxodes* being found on our coast north of the equator, though a nearly allied genus, the *Heterostichus*, has been long known. I was in some doubt whether to refer the fish to *Myxodes* on account of the meagre descriptions of the genus accessible, but having sent a copy of the outline to Mr. Gill, I have been confirmed in the correctness of the diagnosis. The following are some of the most important generic characters not shown in the outline of our species:

Branchiæ VI–VI, the apertures freely connected below. Teeth uniserial in each jaw, those of lower jaw largest, some of those along sides larger than the rest. No teeth on vomer. Scales minute, entire, cycloid, closely adherent—none on head or fins.

The two-lobed form of the spinous dorsal does not apparently exist in some of the species. Suspecting that some of the other characters will be found sufficient to distinguish it, I propose for it provisionally the name GIBBONSIA, in honor of Dr. W. P. Gibbons. of Alameda County, whose descriptions of our viviparous fishes, published in 1854, by the Academy, have only of late been awarded the credit they deserve.

These beautiful little fish are found at low water in holes among rocks along our coast south of Point Conception, and at the adjoining islands. Their varied and elegant coloration would make them beautiful objects for a marine aquarium, but I had nothing suitable for the purpose, in which I could keep them alive long enough to study their habits.

I obtained three at Pt. Loma, San Diego, three at Catalina I., and two at Santa Barbara I., all manifestly of the same species, though differing individually in color, as above mentioned. They have no popular name.

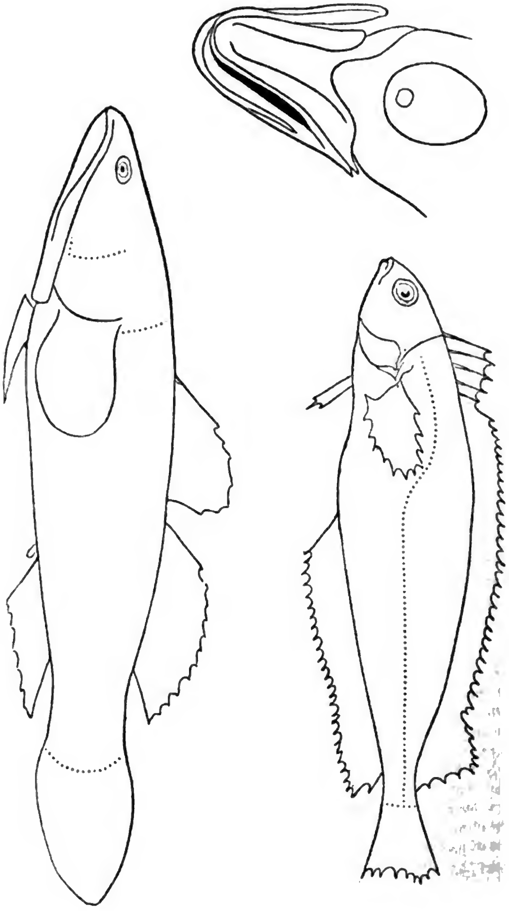
### GILLICHTHYS, n. g.*

*Generic characters.*—Form moderately elongated, laterally compressed. Head depressed, broader than body, forming more than one-fourth of total length. Eyes small, situated far forward, and obliquely turned upward. Mouth moderate, its gape extending to the vertical of the posterior rim of orbit, but the angle of lower jaw half way to branchial aperture. Upper maxillaries extending back the same distance, thence prolonged by a cartilaginous expansion which reaches as far back as the opercular opening, and being there connected to an expansion of the skin of the lower jaw, forms a channel running back from the mouth and as long as the gape of the mouth itself. This channel is entirely free from the side of head, but only slightly movable forwards, so that it cannot serve to widen the mouth when opened.

---

* Named in honor of Mr. THEODORE GILL, of the Smithsonian Institution, Washington D. C., the author of various learned treatises on fishes; ICHTHYS, from the Greek for fish.

FIG. 18.



Premaxillaries not protractile, movable at their symphysis, and only half as long as maxillaries, with which they are connected by a thin membrane, ending below orbit.

Villiform teeth on premaxillaries throughout, also on lower maxillaries to angle of mouth, and on pharyngeals; none on upper maxillaries, vomer or palate. A minute nasal aperature close behind maxillary and another opening just in front of anterior rim of orbit.

Preoperculum covered by the skin of the head.

Branchiæ four, all double, and free, opercular apertures small, as wide as base of pectorals, and separated by the whole width of the base of head.

Tongue broad and thick. Air-bladder small, liver very large and alimentary canal short.

Scales small, cycloid and thin, imbedded in the skin so as to be scarcely perceptible anterior to dorsal fin, or on back. None on ventral surface.

No lateral line perceptible. Dorsal fins two, situated far back, and rather large. Caudal small, obtusely rounded. Anal opposite to second dorsal. Ventrals united into a funnel-shaped disk opposite base of pectorals. Pectorals large and rounded. Fin rays all soft, dividing into three or four branches toward their ends. A small "*papilla genitalis*" in front of anal fin.

Whole fish covered with thick mucous secretion. Skin of head rather loose and soft, and perfectly smooth.

GILLICHTHYS MIRABILIS Cooper, State Coll. No. 627. [Fig. 24.]

*Specific characters.* Scales along middle of side, about 90 in 27 rows.

D. 6-13; C. 13-13; A. 11; V. 6 + 6; P. 20.

| | |
|---|---|
| Length of largest specimen obtained, 5¼ inches | 100. |
| Distance from snout to orbit | .06 |
| Length of orbit | .03 |
| Snout to end of maxillary process | .26 |
| Snout to opercular aperture | .27 |
| Snout to first dorsal fin | .36 |
| Length of base of dorsal fin | .15 |
| Height of dorsal fin | .10 |
| From first to second dorsal | .03 |
| Length of base of second dorsal | .19 |
| Height of second dorsal | .10 |
| Length of caudal | .16 |
| Width of caudal | .12 |
| From caudal to second dorsal and anal | .10 |
| Length of base of anal | .12 |
| Height of anal | .06 |
| From ventral to anal | .26 |
| Height of ventral anteriorly | .02 |
| Height of ventral posteriorly | .08 |
| Height of pectoral | .14 |
| Width of base of pectoral | .08 |
| Lower jaw to ventrals | .27 |
| Width of head between orbits | .02 |
| Width of head at opercula | .15 |
| Height of head at opercula | .16 |

| | |
|---|---|
| Width of body at first dorsal | .12 |
| Height of body at first dorsal | .18 |
| Width of caudal at base | .02 |
| Height of caudal at base | .09 |
| Distance between ends of maxillary processes | .58 |

*Colors.*—When alive mottled with light and dark olive, paler below, sides of head reddish. In alcohol black, pale below, and scales below middle of sides finely punctate each with 8-10 dots, only visible under a microscope.

*Hab.*—I found these remarkable fish only in San Diego Bay, and in but one station, which was among seaweed growing on small stones at the wharf of Newtown the military post, in November, 1861. They were left by the receding of the tide, and must have been out of the water from three to six hours daily, though kept moist by the seaweed. The four obtained were all females containing large masses of ova, and may have come to the spot in order to deposit them.

I could not obtain a glass vessel suitable for an aquarium, so as to keep them alive and observe their habits. The use of the strange maxillary processes or channels is obscure, nothing analogous being known in other fishes, the nearest approach to them being apparently the lengthened maxillaries of some *Salmonidæ* and *Clupeidæ*, fish of entirely different habits and affinities, this one being evidently one of the *Gobidæ*. The stomach contained small crabs, apparently swallowed whole.

### PTEROPLATEA Müller and Henle, 1837.

*P. marmorata*, Cooper, State Collection, Species 674. [Fig. 25.]

*Specific characters.*—Outline of disk rhomboidal, the anterior borders forming an obtuse angle in front, nearly straight in their course to the lateral angles, which are sub-acute; the posterior borders rounded.

Ventrals small, oblong, obtuse-angled, projecting a little behind the disk. Tail nearly twice the length of ventrals, slender and pointed, flattened laterally behind the spine, and bordered by a very narrow membrane, commencing opposite the end of the spine below, and ending a little farther back above.

Spine arising at a point one-third the length of the tail from its base, one-sixteenth of its length, and less than a fourth as wide as it is long.

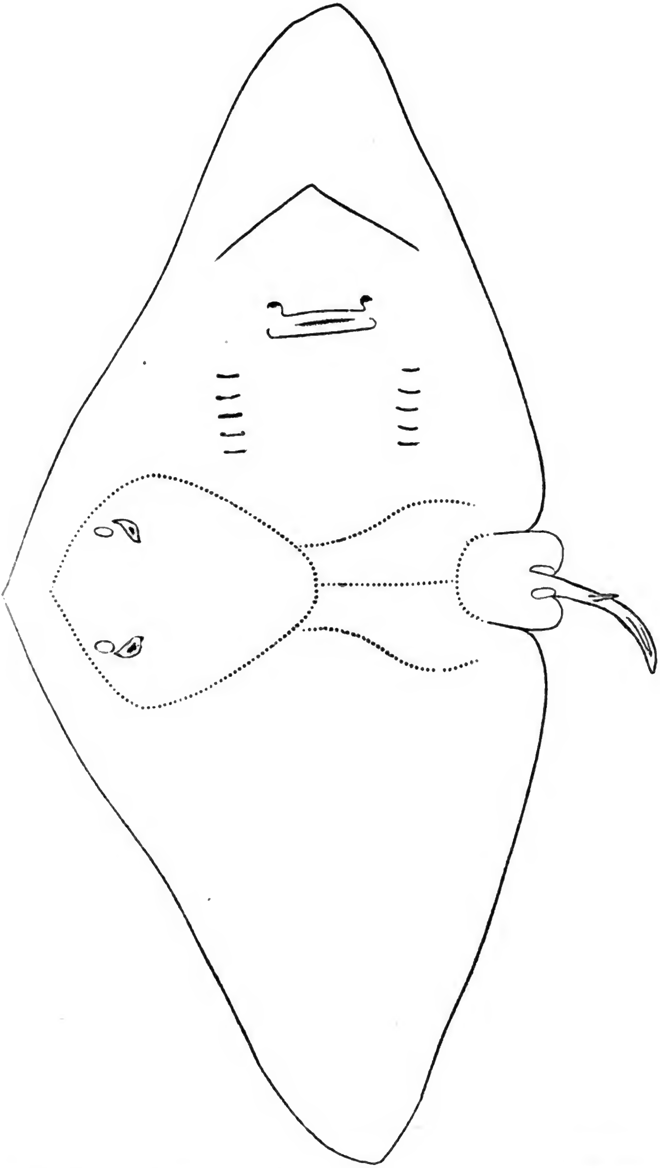
Both surfaces are nearly flat.

Proportional measurements:

| | |
|---|---|
| Total length of specimen, 9¼ in | 100. |
| From median line to tip of pectoral | .80 |
| From anterior angle to eyes | .13 |
| From anterior angle to ventrals | .70 |
| Antero-posterior length of ventrals | .10 |
| Length of claspers | .04 |
| Length of tail beyond ventrals | .25 |
| Length of caudal spine | .04 |
| Distance between eyes | .15 |

*Colors.*—Thickly marbled with blackish and grayish mottlings equal in size: ventrals and tail with a few scattered white spots; below, white. It is probable that the colors are variable, as in the allied *Urolophus*.

Fig. 25.



I was doubtful at first whether to consider this fish a *Pteroplatea*, as that genus is described by Richardson as having the mouth curved, and the dental plate extending to its corners, also the teeth lobed. These characters, however, may change with its growth, this being evidently a young specimen. Mr. Gill, of the Smithsonian Institution, Washington, D. C., to whom I sent a figure of it, agrees with me in referring it to this genus.

Compared with the *P. Maclura* (Lesueur), of the Atlantic coast, described and figured by Dekay in the Nat. History of New York, this species is less wide in proportion to its length, the difference being as 10 to 16. There is also some difference in the markings. The *P. Maclura* is said to attain the enormous width of 18 feet.

I found but one specimen of this fish at San Diego, where it was caught in a seine. I have also seen one, when the steamer was lying at anchor, at San Pedro, swimming near the surface of the water, apparently supporting itself by flapping its wing-like expansions, while it progressed slowly by lateral motions of its tail.

NOTE.—By an oversight of the printer, the proper references to the figures on page 110 were left out. The reader will however understand from the descriptions that the right hand figure is the *Myxodes* (Fig. 23), and the others the *Gillichthys* (Fig. 24).

---

## REGULAR MEETING, JANUARY 18th, 1864.

### President in the Chair.

Present twelve members, four visitors.

Donations to the Cabinet: Cone of *Pinus pinea* from the south of Europe, by Mr. Grosseillier. Bottle of Scorpions and other insects, by Mr. Dawson. Jar of fruits, and cloth made by the natives of Hilukukaki Island, by Capt. J. B. Edwards. A jar of alcoholic specimens from Rio Janeiro, one from Panama, and one from Acapulco, by S. Hubbard. A specimen of *Phasma* from Manzanillo, Mex., by Col. Heintzelman. A specimen of *Gordius* from this vicinity, by Mr. Keith. A box of cretaceous and tertiary fossils from the Atlantic States, by the Smithsonian Institution.

Donations to the Library:

Correspondenzblatt des Naturforschenden Vereins zu Riga, 13ter Jahrgang; Riga 1863. Verhandlungen der K. K. zoologisch-botanischen Gesellschaft in Wien, Band XII, Heft 1, 2, 3, 4, Wien 1862. Personen-Orts-und Sach-Register der Sitzungsberichte und Abhandlungen der Wiener K. K., Zool. bot. Gesellschaft, Wien 1862. Oversigt over det Kongelige danske Videnskabernes Selskabs Forhandlinger Aaret 1861; 8vo. Kiöbenhavn. Der Zoologische Garten, IV Jahrgang, Nr. 1–6, 1863, 8vo. Frankfurt a M. Proceedings of the Royal Horticultural Society, Vol. III, Nos. 6, 7, June and July, 1863. Schriften der Koniglichen physikalish-ökomischen Gesellschaft zu Königsberg, IIIter Jahrgang, Abtheilungen 1, 2, 4to, 1862–3. Abhandlungen der K. K. geologischen Reichsanstalt, Band I–III & IV, 1–2, 3–4, 4to, Wien 1855–6. Jahrbuch der K. K. Reichsanstalt, Band XII 3, 4; XIII, 1, 8vo. Wien 1862–3. General-Register der ersten zehn Bände des Jahrbuchs der K. K. geol. Reichsanstalt, 8vo. Wien 1863. Considerations on the phenomena attending the fall of Meteorites on the earth, by W. Haidinger, (from the Philosophical Magazine for Nov. and Dec., 1861.) Seven papers on natural History, by George V. Frauenfeld, extracted from the "Verhandlungen der K. K. Zool. bot. Gesellschaft in Wien. Also three papers by Messrs. Böck, Brunner, V. Wattenwyl, and Doleschall, from the same journal, together with the seven papers mentioned above, presented by G. Ritter V. Frauenfeld.

Prof. Whitney remarked that these donations were of great value, especially those relating to the Geological Survey of Austria, obtained through Baron von Richthofen. On motion, the special thanks of the Academy were tendered to him and to the "K. K. Geologischen Reichsanstalt" for the donation.

Sheet seven of the Proceedings of this Academy, pps. 97–112, was received from the printer.

Committees of Finance and of Publication were then elected.

Dr. Cooper, on behalf of Dr. Newcomb, corresponding member, presented the following paper on new Californian Helices, all of which, except the first species, were discovered by Dr. Cooper, while connected with the State Geological Survey.

## Descriptions of Nine New Species of Helix Inhabiting California.

BY W. NEWCOMB, M.D., OF OAKLAND, CAL.

### HELIX L.

*Helix Hillebrandi* Newc.

H. testa supra planulata, luteo-cornea, sub-carinata, fasciis albis bi-cingulata, sub-lente crebre granulata, hirsuta; anfractibus 6 undique minute striatis, striis oblique transversis; anfr. ultimo descendente; umbilico late-aperto;

apertura lunari-ovale; peristomate tenuo, albo, reflexo, prope umbilicam expanso.

Lat. maj. 0.9, min. 0.8 pol. Alt. 0.35 pol.

*Hab.* Tuolumne County, California.

Shell sub-planulate above, yellowish horn color, sub-carinate, under the glass thickly granulate, hairy (?) ; whorls 6 very finely striate, striæ obliquely transverse; the last whorl descending; umbilicus broadly open; aperture lunate oval; lip thin, white and reflected, near the umbilicus expanded.

Remarks.—But one recent specimen, with a number in a fossil state, were collected by M. Voy and kindly placed in my hands. The granulated surface is confined to the epidermis, and the summit of many of the granules is marked with a cicatrix indicating a hirsute character. The nearest allied species is *H. Dupetit-Thouarsi*, from which it differs in its more depressed form and surface-structure. It is dedicated to Wm. Hillebrand, M.D., of Honolulu, a well-known naturalist.

*Helix Tryoni* Newc. State Collection, Species 1098.

H. testa solida, depresso-globosa, anguste obtecte umbilicata, supra cæruleo-cinerea, infra sordido-alba, spira sub-turbinata; anfr. 6 convexi, ultimus descendens; striæ sub-lente numerosæ insculptæ circum-volutæ; apertura sub-rotundata; columella callosa, obsolete unidentata; peristoma vix reflexum, introrsum callosum.

Diam. maj. 1, min. 0.88 pol. Alt. 0.75 pol.

*Var. b*, anfr. superiores undis transversis albis.

*Hab.* Insulis "Santa Barbara," et "San Nicolas," Cal.

Shell solid, depressly globose, umbilicus narrow and covered, above of an ashy sky-blue, below of a dirty white; spire sub-turbinate; suture well impressed, whorls 6 convex; numerous microscopical striæ, sculptured and revolving with the whorls; aperture rounded; columella callous, obsoletely one (sometimes two) toothed; lip scarcely reflected, thickened within; *var. b*, superior whorls with white transverse undulating lines.

*Hab.* Santa Barbara, and San Nicolas Islands, Cal.*

This species was found in great abundance alive. The animal is of a deep smoky hue, almost black, with *sometimes* the terminal half-inch of the foot of a dirty white. It is dedicated to a distinguished American Conchologist.

*Helix crebri-striata* Newc. State Collection, Species 1036.

H. testa obtecte vel aperte umbilicata, turbine-depresse-globosa, translucido-cornea; anfr. 5 convexiusculi, ultimo descendente; apice sub-mamillato; sutura bene impressa; striæ transversæ valde et creberrime insignæ, striæ longitudinis microscopice incisæ; apertura sub-rotunda; peris. diverso (tenue, acute, sub-reflexo, vel crasso intus calloso) approximato cum callo profuso conjuncto, vel sine callo; prope umbilicam expanso.

Diam. maj. 0.92, min. 0-75 pol. Alt. 0-55 ad 0-80 pol.

*Hab.* Ins. "San Clemente," Cal.

---

*This is the "*H. Kelletii*" mentioned on page 63 of this volume.—J. G. C.

Shell with a covered or open umbilicus, turbinately depressly globose, whorls 5 a little convex, the last descending; suture well impressed; transverse striæ well and densely shown, longitudinal striæ fine and impressed; aperture rounded; peristome various (thin, acute, a little reflected, or heavy, with an interior thickening) approximate, with (or without) a profuse callus connecting the outer and inner lips; near the umbilicus the columellar lip expands so as to partially cover the perforation.

*Hab.* San Clemente Island, Cal. Abundant.

This shell, so difficult to describe, owing to its variable characters in different specimens, makes the nearest approach to *H. Kelletii* Forbes, from which it may readily be distinguished by its sculpture and other characters. In size and the elevation of the spire, it is one of the most variable of the California species of Helix. Distinguished from *H. intercisa* W. G. Binney, by its not being *solid*, having the umbilicus partially or completely *open*, and from the figure referred to, in being more depressly trochiform in shape. The locality of *H. intercisa* is given as "Oregon Territory." The shell varies in some minor particulars, as in the want of a rufous apex, and its not being of the same color; in other respects it seems to be a closely allied species.

*Helix rufocincta* Newc. State Collection, Species 624.

H. testa depresso-globosa, cornea, rufo-unifasciata, umbilicata, sub-lente decussata-striata; anfr. 6 ultimus non descendens; apertura sub-rotundo, labio reflexo, albo; sutura impressa; columella non callosa.

Diam. maj. 0.70, min. 0.60 pol. Alt. 0.40 pol.

*Hab.* San Diego, et Insula "Santa Catalina," Cal.

Shell depressly globose, horny, red-banded, umbilicate, under the lens decussately striate; whorls 6, the last not descending; aperture sub-rotund; lip white, reflected; suture impressed; columella not callous.

The adult of this species is allied in outline to *H. Pytyonesica* Pfr., but is less elevated, and bears in other respects no especial relation to that species. The size varies considerably, and the umbilicus in some specimens is nearly closed, while in the typical specimens it is quite open.

But one dead specimen was found at San Diego; but on Catalina Island it was more common, 19 adult and mostly living specimens occurring, æstivating on the under surface of stones, in June.

*Helix Gabbii* Newc. State Collection, Species 1097.

H. testa sub-obtecte umbilicata, tenuis, pallide cornea, depresso-orbicularis, fusco obscure zonata; anfr. 5 convexis ultimus descendens; sutura bene impressa; apertura sub-orbiculari; labro albo non calloso, reflexo.

Diam. maj. 0.40, min. 0.35 pol. Alt. 0.20 pol.

*Hab.* Insul. "San Clemente," Cal.

Shell with umbilicus partially covered, thin, pale corneous, depressly orbicular, with an indistinct brown band; whorls 5 convex, the last descending; lip white, not thickened, reflected.

I have seen but a solitary specimen of this species. The size corresponds nearly with *H. facta*, but the thinness of the shell, the color, the more rounded whorls, the deeper suture, and the thin, white, reflected lip, sufficiently characterize this as a distinct species.

*Helix facta* Newc. State Collection, Species 1099.

H. testa obtecte rimata, depresso-orbiculari, solida, compacta, glabra, albida, fusco-rubro uni-zonata; anfr. 5 ad 5½ convexiusculi, ultimus descendens; sutura modice impressa; apertura ovalis; labro crasso, reflexo, flavido.

Diam. maj. 0.42, min. 0.35 pol. Alt. 0.22 pol.

*Hab.* Insul. "Santa Barbara," et "San Nicolas."

Shell with perforation covered, depressed orbicular, solid, *compact*, smooth, whitish, zoned with a brownish red band; whorls 5 to 5½ somewhat convex, the last descending; suture slightly impressed; aperture oval; lip thick, reflected, yellowish.

A sub-fossil variety measures 0.60 by 0.32 inches. Very numerous on Santa Barbara Island; less so on San Nicolas.

This species differs so essentially from the ordinary type of California Helices as to suggest a tropical region as its original habitat. One character in common with many of our species may be noticed, viz.: the colored band cutting the body whorl, inclosed between two faint light colored cinctures.

The shell has a little the aspect of *H. Rothi* Pfr., from the Island of Syra, but is smaller, less elevated, and with a thick reflected yellow lip.

*Helix Whitneyi* Newc. State Collection, Species 1112.

H. testa corneo-fumosa, sub-planulata, polita umbilico perspectivo; sutura bene impressa; apertura lunaris; labro simplici; anfr. 4.

Diam. 0.20 pol. Alt. 0.10 pol.

*Hab.* propé "Lake Taho," Cal., in montibus "Sierra Nevada," elevatione 6100 ped. Angl.

Shell smoky horn color, nearly flat above, smooth, with a perspective umbilicus; suture well impressed; aperture lunate; lip simple; whorls four.

In the umbilicus resembling *H. striatella* Anthony, with a smooth surface and a dull, smoky hue. Only three specimens were found, under damp logs and bark along a mountain stream, together with *H. Breweri*, and *chersina*.

*H. Breweri* Newc. State Collection, Species 1113.

H. testa discoidea, pallide-cornea, nitida, lucida; sutura sub-canaliculata, late umbilicata; anfr. 5. apertura lunaris; labro tenue simplici.

Diam. 0.20 pol. Alt 0.10 pol.

*Hab.* prope "Lake Taho," Cal., et montibus septentrionalibus.

Shell discoidal, pale corneous, shining, transparent, suture slightly channelled, broadly umbilicate; whorls 5; aperture lunate; lip thin, simple.

This shell may be compared with *H. arborea* Say, from which it differs by its less elevation, more polished and lighter colored surface, and more open umbilicus. Eight specimens found; one from Northern California, by Prof. Brewer.

*Helix Duranti* Newc. State Collection, Species 987.

H. testa depressa, discoidea, pallide-cornea sub-lente minutissime striata, opaca, late et perspective umbilicata; anfr. 4. ultimus declivis non descendens; sutura linearis; apertura rotundata-lunaris; peristomate simplici, approximato.

Diam. 0.20 pol. Alt. 0.07 pol.

*Hab.* "Santa Barbara Island."

Shell depressed, discoidal, pale corneous, under the lens minutely striated, opake, broadly and perspectively umbilicated; whorls 4, the last shelving but not descending (at the aperture); suture linear; aperture rounded, lunate, lip simple, the external and internal approximating.

This pretty little planorboid Helix bears a striking resemblance to *Planorbis albus* Muller, (*hirsutus* Gould,) especially in its upper aspect. Beneath, the whorls are less distinctly shown than in the *Planorbis.* I take pleasure in dedicating this species to Professor Henry Durant, of the College of California.

In addition to the above, the State Collection contains the following species of Californian Helices:

*Helix arrosa* Gould, sps. 858, common near mouth of S. F. Bay. Also a yellow variety from Santa Cruz, Mr. Rowell.

*Helix Californiensis* Lea, (?) sps. 969, or a var. of *H. nickliniana Lea?* J. G. Cooper.

*Helix Carpenteri* Newc., sps. 1136, a broken dead shell, from the head of San Joaquin Valley, Mr. Gabb.

*Helix Columbiana* Lea, sps. 901, near San Francisco.

*Helix chersina* Say, sps. 1125, found near Lake Taho; very large. J. G. C.

*Helix Dupetithouarsi* Desh. sps. 492, from Point Cypress, Monterey. J. G. C.

*Helix exarata* Pfeiffer, sps. 920. Mt. Diablo, Prof. Brewer; Santa Cruz, Mr. Rowell.

*Helix fidelis* Gray, sps. 1135, Humboldt Bay, and mountains near lat. 42°. Prof. Brewer. A black variety; Dr. Frick.

*Helix infumata* Gould, sps. 880, near Ballenas Bay, Mr. Rowell.

*Helix Kellettii* Forbes, sps. 856, San Diego, and Catalina Island; the latter a very fine variety. J. G. Cooper.

*Helix loricata* Gould, sps. 880, near Oakland, Dr. Newcomb.

*Helix Newberryana* W. G. Binney, sps. 881, Temescal mountains, near Los Angeles, Prof. Brewer.

*Helix Nickliniana* Lea, sps. 912, near S. F. Bay; common. J. G. C.

*Helix sportella* Gould, sps. 899, near San Francisco. J. G. C.

*Helix mormonum* Pfeiffer; San Joaquin Valley, Mr. Gabb; north to Mount Shasta, Prof. Brewer.

*Helix Traskii* Newc., sps. 863, from mountains near Santa Barbara, Prof. Brewer. May be a variety of *H. Dupetithouarsi.*

*Helix tudiculata* Binney, sps. 768, near San Diego and San Pedro. J. G. C.

*Helix Vancouverensis* Lea, sps. 1093, Straits of Fuca, Mr. Gabb. Perhaps extends south to Humboldt Bay.

## Regular Meeting, February 1st, 1864.

President in the Chair.

Eleven members present.

Donation to the Cabinet: A collection of dried plants from Arizona, by Mr. Spence.

Prof. Brewer presented the following papers:

## Description of a New Species of Virgularia from the Coast of California.

BY WM. M. GABB.

### Virgularia Lam.

*V. gracilis* Gabb.

Polypidom long and very slender. Decorticated stem circular or elliptical in section, smooth on the surface. Polypiferous lobes, slender, exsert, lunate, acute at the tips and broad at the base; arranged obliquely and alternately on the antero-lateral face of the stem. These lobes occupy the upper half of the polypidom; retaining their full size to the extreme apex, but diminishing below, so that on the middle of the stem they are exceedingly minute; and an inch or two below, are only represented by a slight ridge on the sheath, in which are two or three cells. The lower fourth of the sheath is dilated to about three times the thickness of the rest of the stem.

Length 19 inches; diameter of the naked stem .03 in.; smallest diameter of stem, with the sheath, .04 in.; diameter of expanded base .13 in.; length of largest lobes .15 in.

Locality, Bay of Monterey, 20 fms. Collected by Dr. J. G. Cooper, of the State Geological Survey.

This species can be at once distinguished from *V. elongata*, G. (Proc. Cal. A. N. S., vol. 2, p. 167) by its more slender form, its proportionally large polypiferous lobes, its cylindrical stem, without any grooves, and by the comparatively smaller portion of the stem bearing the lobes.

## Notice of Plants found Growing in Hot Springs in California.

BY PROF. WM. H. BREWER, OF THE STATE GEOLOGICAL SURVEY.

More than two years ago I laid before this Society some facts in regard to the growth of plants in the thermal waters of this State. Since that time we have more observations, and some of the facts are worthy of record, although the fact is not new that plants will grow in hot water.

At the Geysers in Lake County, there are numerous hot springs and steam jets, in and around which there is an abundant growth of a low form of vegetation (*Nostoc?*) growing on the soil and covering it with a bright green coating. In some of the warm springs and streams it accumulates in considerable quantities in the water. The highest temperature of water observed at the time of our visit, in 1861, was 207° F.; the water of many of the springs boiling violently at temperatures ranging from 196° to that stated. This vegetable flourished in waters of the temperature of 200° F., but was most abundant where the temperature ranged from 125° to 140° F. It coated the soil around the steam jets, where it would be alternately exposed to the jets of steam issuing at a higher temperature than that of boiling water, and of the cooler air.

In water of the temperatures of 100° to 125° there are filamentons algæ.

At the Little Geysers similar facts were observed.

In Plumas County, near Lassens Peak, there are three groups of hot springs, at all of which the same form of vegetation is abundant under similar conditions, especially around steam jets. Various gases, especially sulphohydric and sulphurous acids, accompanying the steam in all of these localities, and the soil is generally impregnated with various saline substances. All the specimens of the plants were unfortunately lost, so that no microscopic examination has been made, further than could be done on the spot with a pocket lens.

Near all of these springs, the *Panicum thermale* Bolander, grows on the saline soils, sometimes where the soil is warm and the grass is subjected to steam; but its station appears to depend more upon the saline character of the soil than upon its temperature. It was frequently found on soil saturated with sulphates of soda, lime, etc., and having a strongly acid reaction.

None of these forms are universally found about all the hot springs of the State; many springs have been visited where neither of them occur, but where one is found the other is generally found also.

Dr. Cooper presented the following paper for Dr. Newcomb, corresponding member:

## Description of a New Species of Pedicularia.

BY W. NEWCOMB, M.D.

PEDICULARIA Swainson.

*Pedicularia Californica* Newc.

P. testa depresa-globosa, coccinea, minuté transversé striata, supra rotundata, infra laté aperta; labio expanso, semi-circulare; columella crassa, dilatata, intus recta; apertura elongato sub-ovata; extremitatibus effusis:

Long. 0.4 pol.
Lat. 0.3 "
Alt. 0.25 "

Hab. *California.*

Shell depressly globose, crimson colored, minutely transversely striated, above rounded, below broadly open; lip expanded, semicircular; columella thick, dilated within, straight; aperture elongately sub-ovate; extremities broadly notched.

The Genus Pedicularia was established by Swainson for the reception of a single species (*P. sicula*) of that author. During the past year another species has been added by that eminent Naturalist, G. P. Deshayes, of Paris.

In a work published, on the shells of the Isle of Bourbon, he describes a beautiful violet-colored species under the name of *P. elegantissima*. The California species (of which only one specimen has been obtained) can scarcely be surpassed in brilliancy by its Indian Ocean congener, although bearing the exquisite name of *elegantissima.*

For the specimen of the species here described, I am indebted to the extreme liberality of D. N. Robinson, Esq., of San Francisco, who obtained it from a coral growing on a monster crustacean of the genus *Echidnocerus*, which was taken in very deep water at the Farallones Islands.

## REGULAR MEETING, FEBRUARY 15th, 1864.

Vice-President Trask in the Chair.

Present thirteen members.

Messrs. A. Thyark and R. E. C. Stearns were elected resident members.

Donations to the Cabinet: Coral, from the Aitutaka Islands, by Capt. Edwards. Botanical specimens from the White Mountains, N. H., by Dr. Cooper.

Donations to the Library: Report of the Committee to prepare a plan for a State University. Journal of the Society of Arts and of the Institutions in Union, London, Eng. American Journal of Science and Arts for November, 1863.

Mr. W. P. Blake exhibited specimens of Coal, said to have been found on the mountains east of the Colorado River, about twenty-five miles from La Paz. He stated that it was of very good quality and seemed too brilliant for surface coal, but that this might perhaps be attributed to the dryness of the climate. He had, however, doubts as to the occurrence of coal associated with obsidian, as was stated to be the case with these specimens.

The publishing committee was authorized to furnish copies of the Proceedings for 1863 to certain libraries and journals in this State.

## REGULAR MEETING, MARCH 7th, 1864.

President in the Chair.

Present twelve members; also Messrs. Turnbull, Smith, Gardiner, and Burgner, by invitation.

Donation to the Cabinet: Stuffed skin of a large venomous Snake, from the Sierra Madre of Mexico, east of Mazatlan, presented by Mr. Burgner.

Donations to the Library: Pamphlets on the North American Helicidæ, by Thomas Bland, extracted from the Annals of the N. Y. Lyceum of Natural History. American Journal of Science and Arts for January, 1864. Boston Journal of Natural History, Vol. VII, No. 4.

Dr. Behr presented the following paper:

## On Californian Lepidoptera. No. IV.

BY H. BEHR, M.D.

### FAM. VANESSIDÆ.

### GRAPTA.

*Grapta Comma* Harris.

I possess but one specimen of this Grapta. It was collected by Dr. Hillebrand, in Yosemite Valley, during his late visit to California. It agrees in all essential points with two other specimens which I obtained through the kindness of Mr. W. H. Edwards, of New York. The California specimen differs by a somewhat lighter coloration on both sides, especially below where the ground color passes into a yellowish brown, while in the Eastern specimen it becomes a bluish gray. On the upper side, also, the bluish coloration of the edge of the angulated wings of the Eastern form is replaced by a yellowish tint.

I would be inclined to take *G. Comma* for a local variety of *G. C-album,* were it not for the caterpillar, which, according to Mr. Harris, resembles that of *G. interrogationis,* and is entirely without that strangely dimidiate coloration so characteristic in *G. C-album.*

In *G. C-album* I cannot find any difference between my Californian and European specimens. Our vernal generation is larger and somewhat lighter colored than any European specimens I have ever seen. The caterpillar has a curious dimidiate coloration, which I have never seen except in this species: the fore part being white, the abdominal part yellow. I found it on Urtica, but it will probably be found on other Urticaceous plants, herbaceous as well as arborescent. *G. C-album* is not common in the immediate neighborhood of San Francisco, but it is rather abundant in woody and mountainous districts.

The Atlantic States are richer in species of this genus than either Europe or California, the two latter of which possess the same number of species.

| Europe. | California. | Atlantic Slope. |
|---|---|---|
| *G. C-album.* | *G. C-album.* | *G. C-album.* |
| *G. Triangulum.* | *G. Comma.* | *G. Comma.* |
| ——— | ——— | *G. Faunus.* |
| ——— | ——— | *G. Progne.* |
| ——— | ——— | *G. interrogationis.* |

### VANESSA Fabr.

*Vanessa Californica* Boisd.

The caterpillar of this species feeds on Ceanothus, and lives socially like that of *V. Urticæ* L., from which it differs very little. It is of a velvety black, and the spines which cover it are also black.

*V. Californica* is remarkable from its being one of the few wandering Lepidoptera yet known. The first migration I observed was on November 15th, 1856, when numbers of this butterfly flew over San Francisco in a general direction of south-south-east. They flew singly, and never crowded into swarms. Most of these butterflies passed over our streets at too great a height to permit close inspection—a few alighting here and there on lamp-posts, sign-boards, or in the more rural parts, on flowers. It was from these that I obtained the specimens in my collection. They nearly all looked worn and shattered, and there were no fresh specimens among them : clearly indicating that they were not raised in the neighborhood of the city, but had come from distant parts. On the 18th some of the stragglers were still to be seen, but on the 19th they had all disappeared. The second migration took place last fall, but did not reach San Francisco. I received a series of specimens, caught by Dr. Cooper, on the road to Lake Taho. Others I received from Oregon, where they were collected by Mr. Gabb, during his geological examination of those northern regions. Neither Dr. Cooper nor Mr. Gabb observed any marked direction in the flight of these butterflies; they agree that the species was strikingly numerous. Mr. Gabb represents it as settling on the ground in dry arroyos, very shy, and when frightened, always returning to the same spot—a behavior which pretty nearly corresponds with that of the nearest relative, the European *V. Polychloros*. Both of these authorities prove merely an unusual number of this butterfly at an unusual time of the year. The description of the habits of the insect, as observed by Mr. Gabb in the Umpqua Valley, show clearly that there it felt at home. By comparing notes received from Mr. Johnson, of Marin County, I have come to the conclusion that the country to the northward, crowded with this Vanessa, must have sent at least one colony south; and I was told by the above-mentioned gentleman, the statement being confirmed by several intelligent farmers of the same neighborhood, that large numbers of a brown butterfly had come from San Quentin, and crossed over that part of the bay which stretches between San Rafael and Saucelito. About the same time, great numbers of the same insect were observed in Lagunita Valley, at the base of Tamal Pais, where the swarms gathered in a great crowd, and disappeared as suddenly as they came.

I trust that my loquacity in regard to the habits of this species will be pardoned. I consider the observation of facts touching the migration of animals, of the highest importance, and think it desirable that all observations on these points should be put on record : so that hereafter, when a sufficient number of instances may have been collected, conclusions may be drawn, and perhaps many hitherto inexplicable points in the geographical distribution of insects, and of organic life in general, may be explained.

This butterfly is rather rare in common years, and is, perhaps, notwithstanding its name, *V. Californica*, not exactly an indigenous species, at least not in the middle counties of our State. Unlike all other *Vanessidæ* known to me, it has but one generation, at least in California, where the imago is always found late in the season. I do not venture to decide whether *V. Californica* requires a longer time for development in the larva state than the other *Vanessidæ*, or whether it has its vernal generations somewhere else in adjacent countries. I have found but one colony of caterpillars. It was in July, and most of the individuals were nearly full grown; they were rather delicate, the majority died in the larva state, seven transformed about the end of the month, and a single chrysalis produced a crippled butterfly.

*Vanessa Milbertii* Godt.

This species is common in woody localities. The caterpillar is very much like that of *V. Californica*, and only a few individuals show a distinguishing mark in the shape of a longitudinal, lateral stripe of sulphur yellow. It feeds on *Urtica*.

*Vanessa Antiopa* L.

There is nothing to add in regard to this long and well-known species. The caterpillar feeds here, as everywhere else, on willows.

The true Vanessæ have about the same geographical distribution as the Graptæ. They also have a predilection for Urticaceous plants. Only the most northern species is amphigeic.

| Europe. | California. | Atlantic Slope. |
|---|---|---|
| *V. Antiopa.* | *V. Antiopa.* | *V. Antiopa.* |
| *V. Urticæ.* | *V. Milberti.* | *V. Milberti.* |
| *V. Polychloros.* | *V. Californica.* | *V. C-album.* |

There is a balance in favor of the Old World—the beautiful type of *V. Io* not being represented on this continent—and also the type of *V. Polychloros*, containing a few species, as, for instance, *V. Xanthomelas*, that make it appear more numerous.

PYRAMEIS Hubn.

*Pyrameis Atalanta* L.

Larva feeds on Urtica.

*Pyrameis Carye.*

This species is by far the most common butterfly in California. The caterpillar is very variable in its coloration, and is so like that of *P. Atalanta*, in company with which it is frequently found, that I have never succeeded in finding any distinguishing characters. It feeds throughout the year on *Urtica* and on several malvaceous plants, and has the habit of all its congeners, of hiding itself in a rolled up leaf.

*Pyrameis Cardui* L.

This most cosmopolitan of all diurnals, affects here, in its larva state, several malvaceous plants, and also the genus *Gnaphalium*, and its relations; but the plant for which it shows the greatest predilection is *Silybum Marianum*, a plant which formerly did not exist here, and has only spread since 1852. It now forms thickets in the neighborhood of San Francisco, as well as near most of our inland towns, but has never spread to a great distance from settlements. *P. Cardui* frequents the same localities, and I found the same species in Australia in the same relation to the same immigrated plant, *Silybum Marianum*. I know very well that *P. Cardui* existed here, as well as in Australia, before the immigration of this Mediterranean plant; but still, it is a remarkable fact that this cosmopolitan butterfly, notwithstanding its ability to adapt itself to plants of the most different families, still clings with such tenacity to a cosmopolitan plant, to whose universal distribution it is perhaps much indebted for the wide range which it itself attains.

Next to the cosmopolitan character of this plant, *P. Cardui* owes its great extent probably to its many generations and certain irregularities in the time of the appearance of the perfect insect; so that small colonies of the species are not so liable to be destroyed by inclemency of climate or exceptional atmospheric agencies; for a being that exists at the same time in the four stages of the egg, larva, chrysalis, and imago, has more chances of escaping cataclysms and deluge than others that are all at one time in the same stage of existence. The extent of the influence exerted by the number of generations, and the irregularity of period, can be very clearly recognized by the circumstance that species with one generation are always the most local; for instance, certain *Melitea, Argynnidæ, Thecla*, most of *Sphingidæ*, etc.; that also the cosmopolitanism develops in proportion to the number of generations, and attains its maximum in certain *Vanessidæ, Danaidæ, Pyrameis*, etc.

*Pyrameis Hunteri* Fab.

This species seems to have, in California, but one generation. It is not common. I have found it only in the latter part of the season, and have not yet succeeded in finding the caterpillar. The genus *Pyrameis* has the widest range of all the genera of this family. It extends through all latitudes from the Arctic regions to the Cape of Good Hope and Cape Horn. On the northern hemispheres it is best represented in California, which country possesses one peculiar species in addition to all three of Europe and the Eastern Slope of the United States.

| California. | Eastern Slope. | Europe. |
|---|---|---|
| *P. Atalanta.* | *P. Atalanta.* | *P. Atalanta.* |
| *P. Carye.* | ——— | ——— |
| *P. Cardui.* | *P. Cardui.* | *P. Cardui.* |
| *P. Hunteri.* | *P. Hunteri.* | ——— |

### JUNONIA Hubn.

*Junonia Cœnia* Boisd et Lec.

Several generations. Caterpillar not yet found in California. From this enumeration of California *Vanessidæ* we find, 1st. That with the exception of *V. Californica*, there is not yet found any species of this group peculiar to our State, for even *P. Carye* exists as well in Chili as here, and is also said to have been found in Brazil. This circumstance is more striking since our *Argynnidæ* and *Melitea* prove altogether local; none of them being identical with Eastern species, unless a *Melitæa*, of the type of *Mylitta*, should be found identical with a form found in Texas. 2. The genera of this group, north of the Tropic of Cancer, are essentially amphigeic, the European *Arachnia* being almost the sole exception. But, as it were, to compensate this, the tropical amphigeic genus *Junonia*, wanting in Europe, extends, on our continent, to high latitudes. 3. As regards the number of species, the genus *Grapta* predominates at the Eastern Slope, *Vanessa* in Europe, *Pyrameis* in California, and our own *Junonia* is counterbalanced in Europe by our *Arachnia*.

### FAM. LIMENITIDÆ.

### LIMENITIS Fabr.

*Limenitis Lorquini* Boisd.

Like its congeners in other parts of the world, this species occurs in shady woods, or on the banks of arroyos. It is peculiar to California and Oregon.

*Limenitis Eulalia* Doubleday.

In localities similar to the preceding species. These two species are, as yet, the only ones found in our State. They represent a peculiar type, forming, in their coloration, a transition from *Limenitis* to the South American genus *Heterochroa*. Neither of these Californians have been found on the Eastern Slope. *L. Eulalia* extends to Mexico.

The family *Apaturidæ* as yet, has not been found in California.

---

Dr. Trask offered the following article:

## Earthquakes in California During the Year 1863.

BY JOHN B. TRASK, M.D.

During the year 1863 we have had but five earthquakes, and as in former years they have been marked by no serious event, if we except the light degree of fright induced at the time among our people.

January 25th.—A severe shock was experienced at San Diego at 2h. 20m. M., which lasted five to eight seconds. There was no undulation in this case, it consisting of a series of sharp jars. It was preceded by a deep rumbling noise.

February 1st.—A very smart shock at the Mission San Juan, Monterey County, at 4h. 1m. P. M. This shock was felt at Gilroys at 4h. 15m. This town is twelve miles east of the former. At both places the shock was marked by the undulatory motion. It was not observed at Monterey, which is nearly twelve miles west of the Mission.

June ——— A smart shock at midnight at San Francisco.

August 1st.—Two light shocks at San Francisco, at 10h. 48m. P.M., and at 11h. 6m. P. M., another shock.

December 19th.—At 2h. 38m. P.M. a smart shock was felt throughout the city; directly afterwards another and more severe one occurred. The first was a short, sudden jar, while the second was undulatory. The accuracy of the telegraph operator at Santa Clara has enabled us to form a correct idea of the course of this shock, and to correct to some extent the popular errors relating to the direction of the seismic wave. His time was 2h. 44m. 31s., being within 29 seconds of true time, which would then be 2.45. This gives us only 6½ minutes difference in elapsed time, and gives for the direction of the wave an east course in place of north and south, as reported, which corresponds to our measured observations here. I take this opportunity of expressing the thanks of the Academy to this operator for his accuracy and kindness in furnishing us data in this and other phenomena of scientific and public interest.

### February and March, 1864.

During the present year, 1864, we have had two smart earthquakes at the date of writing this report.

February 26th.—At San Francisco a light shock at 0h. 40m. M., and another at 2h. 10m. M. These were reported to me by persons who were up in the south and west parts of the city. At 5h. 47m. a very smart shock occurred, having three distinct vibrations, which induced many to rise somewhat earlier than was usual. This earthquake was preceded by a strong *electric storm* (so called here), between this city and Visalia; the particulars of which have not as yet all come to hand. It was followed next day by one of those severe "northers" with which the people of this State are very familiar. Barometer very low. This fact is mentioned only on account of the unseasonable period at which the gale occurred.

This earthquake was felt more severe at San José and Santa Clara than at this place, and occurred at nearly the same hour.

March 5th.—A severe shock of earthquake at San Francisco at 8h. 49m. M. The first wave had a north and south direction and continued 1¾ seconds; nearly 1¾ seconds elapsed before the second shock, which was at 8h. 49m. 3s., and continued 1½ seconds. The second shock was rotatory; the pendulum swinging north and south from the first shock, began and continued to describe a short oval or nearly a circle from the effects of the second shock, and continued thus for more than half an hour, until stopped and brought to rest. Magnetism was not suspended in this earthquake, nor any other that has occurred since my instrument was suspended. These observations were made at the height of twenty feet four inches from the ground. The total of time included in the shock was nearly five seconds. The farthest point south to which I have been able to trace its effects is the Mission San Juan, and north to Sacramento, a distance inclusive of 177 miles. In an easterly direction we have not traced it east of Stockton, about 60 miles. It was felt at Santa Clara, Santa Cruz, Gilroys, south of San Francisco, and at Santa Rosa and Petaluma to the north.

Since the above was in type, advices have been received from Visalia. At that locality the shock was very smart. The first shock took place at 8h. 45m. M., being four minutes earlier than that at San Francisco. This gives for the entire distance, north and south (over which the earthquake extended), 257 miles. This extent of latitude, and the almost simultaneous period of time at which it was observed along the entire line of distance so far as heard from, leads to the conclusion that its probable centre was south of San Francisco and nearly in the same longitude. From the violence of its action I feel inclined to the belief that its centre was in the neighborhood of San José, for all accounts agree in this one point, that more turbulence of the earth's surface occurred in this region during its continuance than at any other place yet known. At Visalia the first shock was a mere tremor, but was followed by an undulatory movement when the second shock occurred, which was some three or four seconds later. This wave moved in an east and west direction at that place.

## REGULAR MEETING, MARCH 21st, 1864.

Dr. Trask in the Chair.

Eleven members present.

Messrs. J. G. Kellogg and Jacob Deidesheimer were elected resident members.

Resolutions were passed in memory of the Rev. T. Starr King, late a member of the Academy, and a copy directed to be forwarded to the family of the deceased.

Donation to the Library: "Descriptions of New Species of Tropical American Birds," by Geo. N. Lawrence, extracted from the Annals of the New York Lyceum, by the author.

A discussion was held on the popular error of supposing that thunder and lightning are very rare in California, several members stating from their experience that both are common in the higher and more mountainous portions, at all seasons of the year, though rare in the lower regions.

Dr. Behr stated that he had used the root of the *Aspidium argutum Kaulf.*, successfully as an antidote for tape-worm since the year 1852, and with better results than attend the use of *A. filix-mas* of Europe.

## REGULAR MEETING, APRIL 4th, 1864.

President in the Chair.

Present, ten members.

Professor Whitney read a paper by Major Williamson, U. S. Engineer, giving the methods of determination and results of measurement by barometer of the depression of "Death Valley" below the level of the sea, made in 1860 by the Cal. and U. S. Boundary Commission. Death Valley was found to be the "sink" of the Armagoza River, which runs near the boundary, east of Owen's Lake. The observations, are sufficient to show that the valley is from one hundred to two hundred feet lower than the level of the sea.

## Regular Meeting, April 18th, 1864.

Dr. Trask in the Chair.

Present, nine members.

W. S. Brigham and Horace Mann were elected corresponding members, being about to proceed to the Sandwich Islands to make a thorough scientific exploration, under the auspices of the Boston Society of Natural History.

The name of Mr. Louis Janin, elected in 1861, but accidentally omitted from the list of members, was directed to be published in the proceedings.

Donations to the Cabinet: About two hundred specimens of rocks and ores from Humboldt River District, by Mr. Highton.

Dr. Trask presented the following paper:

### Earthquakes in California from 1800 to 1864.

BY JOHN B. TRASK.

As the subject of earthquakes for some years past has engrossed much of the attention of scientific observers, I have, at the request of several members of the Academy, made out a complete report upon the occurrence of those phenomena upon this coast, as far as personal observation is concerned, and also so far only as we have authentic records prior to the occupancy of the present State of California by the American Government.

The present paper contains, probably, all that can be verified, and places the subject in a form to which future reference may be made by other observers abroad; thus enabling them and ourselves also, to bring together the statistical facts which, it may be hoped, will help to form some rational theory in future years relating to the causal agency of those phenomena, as well as the physical laws governing their action.

In this paper I have reduced the periods of their occurrence for the thirteen years past to astronomical time, in all instances where the hour on which the shocks occurred have been known with certainty, and, without attempting to combat any theory that has been advanced, or the suggestion of another relating to their origin, their history has been left as a record of facts, which will become useful when others of like character accompany them. Our record, in this State alone has reached a little more than one-tenth of the number on which M. Mallet has founded his theory of their origin, and which were drawn from all parts of the world, and although this may seem a large proportion for this district of country alone since 1850, it is not to be presumed that a greater frequency of shocks have occurred here than elsewhere, but that the same attention has not been bestowed in recording their occurrence in other countries where they are known to be much more frequent and severe than upon our coast.

It might be asked why, if such unquestionable frequency occurs within the limits of this State we are not subject to momentary destruction from their effects; the answer to this is found in the preceding paragraph, from which cause it will be seen that our experience is more apparent than real, relatively, and farther still, we should find a much greater frequency of shocks, beyond all doubt, if the instruments for their registry in different parts of the State were more plentiful than at present.

There is no good reason for the supposition that we are in more danger from these phenomena than upon the Atlantic border, for the reason that we are so far removed from the centers of immediate and violent volcanic action, that it would require dangerous tension of the imagination to place California within the range of those physical causes which are so conducive to violent, repeated, and destructive earthquakes. This State cannot be considered more subject to earthquakes than it is to volcanoes, relatively, and this is said too in the face of our own records relating to the former. We need have little fear from these disturbances so long as we are so far removed on either hand from the great centers, and even from the terminal points of those centers of volcanic disturbance, from the action of which such disastrous consequences have, and will again follow to their immediate districts.

A moment's consideration will convince the most sceptical of the prevailing fallacy relating to this subject. In the first place, we are situated between two great termini of active volcanic ranges, the nearest being Colima, 1,200 miles south, the other on the coast of Alaska, more than 1,300 miles to the north; the distance inclusive between the points being nearly or perhaps quite 2,600 miles, in which no active volcanic vents abound, unless we make an exception of Mounts Hood and St. Helen in Oregon, of which the testimony is somewhat dubious, and the nearest of which is 700 miles. To the east there are no volcanoes for a distance of 2,500 miles, and to the west for a much greater distance than in either of the other directions. This, certainly, should be sufficient to palliate the fears of the timid, in some degree at least, and to silence in part also the sensational articles which appear from time to time in the press of this and the eastern States, as to California being an oven within the range of active volcanic action, and a volcanic country.

In preparing this paper I have endeavored to obtain, as far as possible, the most correct information relating to the history of these phenomena in former years. It is my desire also to correct some of the misrepresentations and statements current relating to the severity of earthquake shocks in this country during the earlier periods of its history.

I have at the present time some additional information relating to the great earthquake of 1812, which did not appear in my first paper on this subject, and which must now be placed on record. These facts relate more to the phenomena occurring during that year, rather than to the destruction of the missions, all of which will be found in their proper place below.

From careful inquiry of the early settlers and residents I cannot learn that any more than one earthquake has occurred which was in any considerable degree of a serious character, and but one which has caused the destruction of either life or property to any extent.

This earthquake occurred in the month of September, 1812, and destroyed the Mission San Juan Capistrano, in Los Angeles County, and the Mission Purissima (Viejo) in the County of Santa Barbara. The following is the history of that event as obtained from the older native inhabitants and foreign residents on the coast at that time.

The day was clear and uncommonly warm ; it being Sunday the people had assembled at San Juan Capistrano for evening service. About half an hour after the opening of service, an unusual loud, but distant rushing sound was heard in the atmosphere to the east and also over the water, which resembled the sound of strong wind, but as it approached no perceptible breeze accompanied it. *The sea was smooth and the air was calm.* So distant and loud was this atmospheric sound that several left the building attracted by its noise.

Immediately following the sound, the first and heaviest shock of the earthquake occurred, which was sufficiently severe to prostrate the Mission Church of San Capistrano almost in a body, burying in its ruins the most of those who remained behind, after the first indication of its approach was heard.

The shock was very sudden and almost without warning, save from the rushing sound above noted, and to the severity of the first shock at that moment is to be attributed the loss of life that followed.

The number reported to have been killed outright, is variously estimated from thirty to forty-five (the largest number of persons agree on the smallest number of deaths given), but in the absence of records such statements should be received with many grains of allowance, where memory alone is the only means left, and the term of forty-three years has elapsed before the period at which this account was placed on paper. A considerable number are reported to have been badly injured.

There is a universal agreement on this point with those from whom these facts were derived, viz.: *that the first shock threw down the entire building, and that a large number of persons were in it at that moment,* and under the circumstances it would be most singular if no deaths were caused by such an event.

It is now nine years since the above facts were published, and in March, 1864, a writer to me unknown, corroborates this statement relating to that Mission in these words. "The church thrown down at San Juan Capistrano by an earthquake in 1812, was a well built-affair of stone and cement. The cupola or short steeple falling over the church completely destroying the building."

The motion of the earth is described as having *lifted vertically*, attended by a rotatory movement. *No undulatory* motion is described by any one. Dizziness and *nausea* seized almost every person in the vicinity.

A heavy, loud, deep rumbling, accompanied the successive shocks that followed, which were five in number, all having the motion above described, though comparatively light in their effects to the first. The sounds attending the phenomena came apparently from the South and East.

In the valley of San Inez, to the south and west of Santa Barbara, the church now known as the "Mission Viejo" (La Purissima), was also completely destroyed. At this locality there were also a number of lives lost, but what number is as yet very uncertain. The distance between Capistrano and San

Inez is about one hundred and seventy miles. The shock which destroyed this building occurred about one hour after the former, and the greater portion of the inhabitants had left the building but a few minutes before it fell, service having closed. The first shock felt here prostrated the building, as in the preceding case.

A Spanish ship which lay at anchor off San Buenaventura, thirty-eight miles from Santa Barbara, was much injured by the shock, and leaked to that extent, that it became necessary to beach her, and remove the most of her cargo.

The writer above quoted corroborates the fact of a ship having been in this vicinity at the time. The distance of this ship from Santa Barbara is nearly the same as in my original statement but in a different direction. From the circumstantial details of the writer as to the ship "Charan," *alias*, "Thomas Newland," I am inclined to the belief that his statements are more entitled to adoption than my own; I therefore present his statement also and leave the reader to adopt either, so far as regards the ship and her position. "At the same time a Boston ship the Thomas Newland, known before as the Charan, commanded by Capt. Isaac Whitmore, was lying off the anchorage not far from the Gaviota Pass, Santa Barbara County."

It is an interesting fact, and at the same time somewhat remarkable, that the time which elapsed between the advent of the shocks at Capistrano and San Inez is widely variant from what we should look for, when the distance apart and velocity of motion in earthquakes are taken into consideration. If the velocity of the seismic wave in this earthquake was uniform with those of more recent times, it should have reached La Purissima in twenty-eight minutes and fifty seconds in lieu of an hour; but all due allowances must be made for a question of time in an event of this nature, and also for errors in memory of persons after the lapse of so many years.

The effect of this earthquake on the sea, in the Bay of Santa Barbara, is described as follows: "The sea was observed to recede from the shore during the continuance of the shocks, and left the latter dry for a considerable distance, when it returned in five or six heavy rollers, which overflowed the plain on which Santa Barbara is built. The inhabitants saw the recession of the sea, and being aware of the danger on its return, fled to the adjoining hills near the town to escape the probable deluge."

The sea on its return flowed inland a little more than half a mile, and reached the lower part of the town, doing but little damage, destroying only three small adobe buildings.

Here again I take the liberty of quoting the late writer above noticed, in corroboration of its effects upon the sea. "The sea was seen to retire all at once, and to return in an immense wave, which came roaring and plunging back, over the beach. This wave penetrated the low lands and gulches a mile from the shore, forming one of the most terrific sights possible to conceive."

Very little damage was done to the houses in town from the effects of the shocks, while the Mission at San Inez was prostrated almost instantly. There is no evidence that I can find, that this earthquake was felt in San Luis Obispo, though such has been the report.

In addition to my former paper I will now add some information relating to this and other earthquakes, touching more particularly a series continuing through a long period for such phenomena, but preceding the great event of September of that year.

So far as the archives of the old missions assist us, it is found that from the foundation of the first mission in 1769, up to the year 1800, a period of thirty-one years, not an entry was made of these phenomena. In the latter year an earthquake is recorded as occurring at San Juan Bautista, on the eleventh of October. On the eighteenth of the same month, at supper time another shock was felt, and another still at about eleven o'clock on the same night. From the records of the Presidio of San Francisco, we are able to glean the fact, that between the twenty-first of June and seventeenth of July, 1808, there occurred twenty-one shocks of earthquakes at this post.

I will here correct the popular error relating to this earthquake or series of earthquakes during that year. It is generally stated that this was contemporaneous with the earthquake which destroyed San Juan Capistrano and La Purissima; by reference to the dates it will be seen that the destruction of those missions did not occur until four years later.

The above are the only records of these phenomena that have as yet made their appearance in the archives of the province during the existence of the Mexican Government; and, from the fact that these archives are all in our possession, there is no hazard in stating that they constitute all, of which we have any positive knowledge. As they stand, they are a sufficient rebuke to the mendacity of sensational itemizers of the public press; they will find in those records, no basis on which to indite column articles of such doleful prophecies as the public of late have been surfeited with.

During a period of thirty-nine years the records of the country exhibit the fact, that there were but twenty-three days on which earthquakes occurred and were deemed worthy of record. If we compare these figures with those recorded from 1850 to the close of 1863, we shall find much more ground for prophecy during the latter period than for the eighty-two years of which records were kept on this coast previous to that time.

From the above extracts from the archives we are left to infer one of two facts; either that earthquakes were entirely unknown during the intervals of the record dates, or that they were of so trivial a character as not to merit the notice of the early padres during this time; the latter is the probability, for we can scarcely conceive that nothing of this nature had taken place. If, however, such be the fact, it cannot be looked upon in any other light than a manifest anomaly in the history of this or any other country.

It appears from all the testimony on the subject, that in May, 1812, the south part of the State was frequently agitated with shocks of greater or less severity, and their continuance was literally incessant for about four and one-half months. Their frequency was not less than one each day or two; four days seldom elapsing without a shock. As many as thirty shocks occurred in a single day on more than one occasion. So frequent were they, that the inhabitants abandoned their houses for the greater part of this period, and lived under trees, etc., and slept out of doors at Santa Barbara.

This period of time seems analogous in some respects to the year 1852, and was one of very marked severity on this coast, as was also the latter year; it was analogous to other periods of subterranean disturbance in other parts of the earth since the historic era began, and there is no good reason why we may not look for the recurrence of similar events in future time. But we must not lay too much stress on the destruction of the two mission churches in 1812, to guide us in an estimate of the force of this earthquake, for the construction of those buildings had but little relation to similar structures of modern date, either in strength or material.

From 1812 to 1850, the archives are silent on this subject. In the latter year our record began and has continued with little interruption to 1863, a period of thirteen years. Within that period there are but few earthquakes occurring north of the thirty-ninth parallel which have escaped notice and have not been made matter of record.

## 1850.

During this year the following earthquakes were recorded:

March 12th.—A light shock was felt in San José.

May 13th.—A light shock in San Francisco. An eruption of Mauna Loa, S. I., and shock same day.

June 28th.—A light shock in San Francisco.

August 4th.—A smart shock was felt in Stockton and Sacramento.

September 14th.—Smart shock at San Francisco and San José. Total number recorded in 1850, five.

## 1851.

May 15th.—Three severe shocks in San Francisco. During this earthquake windows were broken and buildings severely shaken. A large amount of merchandize was thrown down in a store on California Street. The shipping in the harbor rolled heavily. An eruption of Mauna Loa and shock in the Sandwich Islands same day.

May 17th.—A light shock in San Francisco.

May 28th.—A light shock on the Salinas.

June 13th.—A smart shock at San Francisco. This was felt at San Luis Obispo and San Fernando.

December 2d.—A shock at Downieville.

December 31st.—A smart shock at Downieville. Total recorded in 1851, six.

## 1852.

From the beginning of this year until the middle of its last quarter, no disturbances of the coast was noted until the month of November. In this month the southern portion of the State was violently disturbed.

November 26th.—The number of shocks on this day at San Simeon was *eleven*, and at Los Angeles and San Gabriel the same number. Nearly or quite the same number was also observed by parties having in charge a Government train in transit from Fort Yuma to San Diego.

This earthquake or the series was experienced over the entire country, east and south of Luis Obispo to San Diego and the Colorado River, covering a line of country about three hundred miles in extent.

From subsequent accounts we learn that it also reached as far as Guaymas, in the province of Sonora, Mexico.

For a period of six days subsequent to the twenty-sixth of November, the whole of this region to the Colorado, was convulsed, with slight intermissions. During this time a *mud volcano* opened on the Colorado Desert, and another south of the river: one of these was visited by a portion of the United States command under Col. Hientzelman.

December 17th.—Two smart shocks at San Luis Obispo, which fractured the walls of two adobe buildings, and threw down a part of the wall of a house belonging to, and occupied by Don Jesus Pico and family.

During the months of November and December, the southern particularly, and middle portions of California were much disturbed; shocks were experienced in those sections for sixty-five days, with variable intermissions; they were noticed as far north as the thirty-seventh parallel, but generally light in their nature. The latest date of this series was to the fifth of January, 1853, on the valley of the San Joaquin.

The period of time inclusive between the sixteenth of November (the date of the terrible earthquake at Banda Neira in the Moluccas), and the twenty-sixth of January, 1853, must be regarded as one of the most remarkable and portentious periods of the earth's history during modern times. For in that period a greater proportion of the earth's surface was convulsed by subterranean forces than has been known for many scores of years, in the same length of time.

The area most severely affected by these phenomena is included between the parallels of forty degrees south latitude and thirty-seven degrees north latitude, and extending from one hundred and twenty degrees east to the forty-fifth degree west longitude, being nearly equal to three-fifths of the equatorial, and a little more than one-half the polar circumference of the earth.

At this time the coast of eastern Asia, the Islands of the South Indian Ocean, Singapore, the fated Moluccas, the east coast of China, the north, east, and south coasts of Australia, the coast of California, Mexico (west coast,) South America, with portions of the Atlantic coast of the United States south of the thirty-fourth parallel, north latitude, shared in the general disturbance which prevailed on our own shores during this time. With the twenty-sixth of January ceased the vibrations on this coast at that time, but we have positive intelligence that they continued much later on the east coast of China and Australia, in which countries they did not cease until the month of February. With these facts before us we cannot but believe the period included one of the most turbulent in the earth's career during modern times.

## 1853.

Jan. 2d.—A shock of earthquake was felt in Mariposa; this was observed in San Francisco, Bodega, and at Shasta City.

Jan. 5th.—A shock at Corte Madeira.

Feb. 14th.—A light shock at San Luis Obispo.

March 1st.—A smart shock at San Francisco, which was felt at San Luis Obispo and Santa Barbara.

April 24th.—A light shock at Humboldt Bay.

April 25th.—Three shocks in quick succession at Weaverville, Trinity County.

June 2d.—Two smart shocks on the plains of the San Joaquin.

July 12th.—A light shock at Yreka, Siskiyou County.

Sept. 3d.—Four shocks on the Salinas and San Joaquin Plains.

Oct. 23d.—Three heavy shocks at Humboldt Bay.

Oct. 25th.—A light shock at Humboldt Bay.

Nov. 16th.—A light shock at San José.

Nov. 21st.—A shock at San Francisco.

Dec. 11th.—A light shock at San Francisco and Mission Dolores.

Dec. 23d.—A light shock at Shasta.

Total in 1853, 15.

## 1854.

Jan. 3d.—Two smart shocks in Mariposa, felt also in Shasta.

March 2d.—A light shock at San Francisco.

March 20th.—A shock at Stockton.

April 29th.—A light shock at Santa Barbara.

May 23d.—A shock at Crescent City.

May 31st.—An earthquake at Santa Barbara at 5h. 10m. In this earthquake there were three distinct waves. The first was accompanied by profound rumbling; the second shock was preceded by a loud, rushing noise like the approach of a strong wind. About four or five seconds elapsed between each shock. The sea was much disturbed, and a heavy surf swell came in soon after the second shock passed. This surf-wave rolled inland some thirty feet beyond the old wreck at the embarcadero. I saw the effect of this wave in July following. The inhabitants were much frightened and left their beds for the open air. Very little damage was sustained.

June 26th.—Two light shocks in Placer County.

July 10th.—One shock at Georgetown.

July 14th.—A shock at Georgetown.

Sept. 14th.—A light shock at Nevada.

Oct. 21st.—A light shock at Monterey.

Oct. 26th.—A smart shock at San Francisco, near midnight. It was felt at Benicia. This shock was followed by a swell in the bay, as vessels at the wharfs swayed heavily on their hawsers.

Total in 1854, 12.

## 1855.

The following is the record of earthquakes for this year, in the State of California, with the date and hour of the day at which they were observed:

Jan. 13th, 18h. 30m.—A smart shock occurred at San Benito and San Miguel. It was felt at San Luis Obispo.

Jan. 24th, 22h.—A heavy shock of earthquake was felt at Downieville, which lasted seven seconds.

This earthquake was quite severe at Gibsonville on the north, at Forrest City, Minnesota, in Sierra County, and at Orleans Flat, Eureka, in Nevada County, at Georgetown and Nashville in El Dorado County on the south, and at Keystone Ranch, in Yuba County, on the west. The entire distance north and south affected was ninety-four miles, and in a westerly line, thirty miles. The shock was preceded by a deep rumbling, and the rushing sound of wind in the distance. It shook buildings severely. A large pinnacle of rocks on the summit of the Downieville Buttes was thrown down, and some of the large fragments reached the south branch of the North Yuba, at the base of the mountain.

Feb 5th, 22h.—A light shock was felt at Wolf Creek and the north-east part of Nevada County.

April 7th, 18h.—A light shock was felt at Gibb's Ferry, Trinity County, and was experienced as far north as Callahan's Ranch, at the head of Scott's Valley, Siskiyou County.

June 25th, 14h.—A smart shock was felt at Santa Barbara, and extended northward as far as the valley of Santa Maria. This shock was cotemporaneous with one that occurred in Switzerland.

July 10th, 9h. 30m.—A light shock was felt in Georgetown, El Dorado County, which lasted about four seconds.

July 10th, 20h. 15m.—A severe shock at Los Angeles, which did considerable damage.

There were four distinct shocks during the earthquake, with a period of about two or three seconds elapsing between each vibration. During their continuance the ground opened in several places, in fissures of one or two inches, the marks of which remained for several days afterwards. There were some twenty-six buildings in the city more or less injured, which I personally examined, and among them the church, the west wall of which was split from top to bottom in two places, the fissures being from one to two and a half inches in breadth, running entirely through. The east wall split at a slight angle from the perpendicular, and had but one fissure. The walls of the Star Hotel were split in several places, and on the west side there appears to have been a decided horizontal motion, as the wall was displaced on that side horizontally to the depth of about one inch, and some eight or nine feet in length. The amount of displacement decreased from the west end of the building towards the center. It is a fact worthy of note, that none of the *thin* adobe walls of the buildings suffered injury, while most of the *thick*-walled buildings were injured to a greater or less extent.

During the earthquake, many articles were thrown down; those that were standing on shelves against the east end of the buildings were thrown westward on to the floor, and those on the opposite end of the buildings were thrown back in an inclined position against the walls. These features were noticed in the drug stores of Doctors Winston and Hope, situated on the main street, and a short distance west of the church.

The meteorological condition of the atmosphere was rather unusual, and is described as follows: The day was unusually warm and sultry, attended with a little rain, (the latter very unusual) and a sudden change of temperature to unpleasant coldness. At Point San Juan there was observed considerable commotion in the water, attended with a strong rushing sound, and two unusually heavy surf swells, immediately *following the last shock.*

This shock was felt distinctly at the saw-mill, some eight miles east of San Bernardino, about seventy miles east of Los Angeles, and at Santa Barbara, about one hundred miles in a westerly direction.

Aug 12th, 9h. 30m.—A light shock of an earthquake was felt at Georgetown, which lasted about three seconds. The vibration apparently came from the north. Between this date and the tenth July there were four other light shocks, the dates of which are not recorded.

Oct. 21st, 19h. 45m.—A smart shock of an earthquake was felt in San Francisco. The buildings situated over the water were violently shaken. There was much commotion in the water of the harbor a few minutes preceding the shock, which caused several vessels to heave heavily at their hawsers and cables.

Oct 27th, 15h.—A light shock was felt in the valley of Clear Lake. On the same day a shock was felt at Downieville, which lasted about five seconds. At Goodyear's Bar it was more severe than at the preceding locality.

Dec. 5th, 11h. 20m.—The shock of an earthquake was felt at Humboldt Bay, which lasted about three seconds. There were two vibrations, the last being the most severe.

Dec. 11th, 4h.—A shock was felt in San Francisco and at the Mission Dolores; at the latter place it is represented as being quite severe.

The whole number of which I have a record for 1855, amounts to twelve only; but there may be others which have escaped my notice on account of absence from the city.

The following table will show the number of shocks for each year, and each month of the year, for six years from 1850 to 1855, inclusive.

| | 1850 | 1851 | 1852 | 1853 | 1854 | 1855 | No. for each month in six years. |
|---|---|---|---|---|---|---|---|
| January, | | | | 2 | 1 | 2 | 5 |
| February, | | | | 1 | | 1 | 2 |
| March, | 1 | | | 1 | 2 | | 4 |
| April, | | | | 2 | 1 | 1 | 4 |
| May, | 1 | 3 | | | 2 | | 6 |
| June, | 1 | 1 | | 1 | 1 | 1 | 5 |
| July, | | | | 1 | 2 | 1 | 3 |
| August, | 1 | | | | | 1 | 2 |
| September, | 1 | | | 1 | 1 | | 3 |
| October, | | | | 2 | 2 | 2 | 6 |
| November, | | | 11 | 2 | | | 13 |
| December, | | 2 | 1 | 2 | | 2 | 8 |
| **Total each year,** | 5 | 6 | 12 | 14 | 12 | 11= | 59 59 |

From the above it will be seen that of the total number of shocks in six years in this State, forty-eight have occurred during the spring, summer, and autumn months, and eleven during the winter months.

Of the total number noted, twenty-seven have occurred from San Luis Obispo south, and of the thirty-two remaining, nine have been felt in San Francisco at the same time they were observed at San Luis Obispo, while the remaining twenty-three were felt at San Francisco and north of that point.

Notwithstanding we have had, what may, perhaps, be considered a frequency in the recurrence of these phenomena, still there are but a *very few* of the total number that would merit a moment's consideration south of the twenty-fifth parallel of north latitude, for there they would be regarded as minor affairs entirely.

From all the facts in our possession relating to the phenomena on our coast, it appears that the greatest preponderance in action and severity of effects, is exerted, for the most part, south of Point Conception, for, from this place, east, south and north, to near the Colorado, the most conclusive evidence exists of very recent volcanic action having been exerted on rather an extensive scale, and is also still persistent in several localities within the area named, though in a minor degree.

It would be interesting to examine the changes of level that have evidently taken place in this State within the last five years; but as more extended observations would greatly assist us in forming conclusions on this subject, I will defer that portion until a future day.

## 1856.

At the close of 1855, I presented to the Academy a statement of the occurrence of earthquakes in this State for that year and a term of years preceding.

During the year just passed, I have kept a careful record of these phenomena, which have been noticed in this city, and other parts of the State, and which will be found below, with their date, and the hour of the day on which they took place; they comprise all that have occurred, with perhaps two exceptions, the dates for which were so obscure as to render it impossible to determine with accuracy the precise period of their occurrence. So far as I am informed, those shocks that have taken place in this State during the past year have not been marked with more severity than has been usual in years preceding, frequently amounting to a slight tremor, and at other times to more distinct movements; three only have possessed sufficient intensity as to command general attention during the busy hours of day.

Very few have been noticed by persons who were standing upon the earth at the period of their occurrence. By far the greater proportion were observed in high situations from the ground, and in the more retired parts of the city, or on the alluvial covering of the country to the west and south.

The total number for the past year is sixteen, and of this number thirteen were observed between sunset and sunrise.

By reference to the statistics below, it will be seen that even mountain districts, where during the day there is much less of turmoil and noise arising from business than in the populous city, that of all those noticed, none have been of sufficient intensity to attract the attention of the inhabitants during the hours of daylight. These facts, though few in themselves, are of importance, to disabuse the public mind in relation to the danger to be apprehended from the occurrence of these phenomena. The character which we sustain both at home and abroad, as being in constant danger of being swallowed up by these occurrences, and that our country is but a bed of latent volcanoes ready to burst forth at any moment, spreading devastation over the land, is one of the greatest fallacies that ever obtained possession of the human brain. Our State is as primitive as Massachusetts or New Hampshire, and the dangers that surround us from the sources above mentioned, are equally great as in the States just named.

We should remember that when speaking of California as a State, that we include a line of territory equaling that of the seaboard lying between Cape Hatteras on the south and the British Possessions on the north, and including eleven of the seaboard States of the Union; and when we place our comparative estimates on this basis in matters of this character, it will become at once evident that the danger of annihilation from the causes under consideration, are not of that magnitude which at first sight would appear.

Along the coast of Mexico and Central America, to the south of California from all the records that are obtainable here there appears to have been a much greater exemption from those phenomena than has been usual in former years; this seems to have been the fact, also, throughout the Pacific, Oceanic, and most of the Continental Islands along the coast of China, while to the north and north-west, beyond the fifty-fifth parallel, both volcanic and earthquake phenomena appear to have been greater than usual. This has been observable, for the most part, in the neighborhood of the Aleutian Archipelago, along the north-east coast of Japan, and in the British and Russian Possessions of North America on the Pacific, and islands of the Ochotsk Sea.

It would be interesting to know more of the predominance of these phenomena in those regions, and such information could be easily obtained from the commanders of the whaling fleet, if the proper measures were adopted to secure it.

Below will be found some interesting matter upon this subject, which took place during the past year near the Straits of Ourinach.

The earthquakes which have occurred in this State during 1856, and the period of their occurrence, is as follows:

January 2d, 10h. 15m.—This morning, a smart shock of an earthquake was felt in San Francisco. The motion of the earth was undulatory, and came apparently from the northward. A pendulum indicated a motion of about five and a half inches.

January 21st, 16h.—Quite a smart shock occurred; it was quite sharp in the south-west part of the city.

January 28th, 3h.—At the town of Petaluma, Sonoma County, a shock of an earthquake occurred. It was sufficiently heavy to awake persons from their sleep.

January 29th, 0h. 45m.—A slight shock was felt in San Francisco. It was observed also at the Mission Dolores. There were three distinct tremors, with short intervals elapsing between. The motion was apparently from the westward.

February 15th, 5h. 25m.—A severe shock of an earthquake was felt in San Francisco, the duration of which was about eight seconds. Persons sleeping were aroused, and many persons left their beds and sought the street. There were two distinct shocks, the second very light and scarcely perceptible. The motion was *undulatory* and *vertical*, and at the end of the first shock a very strong, profound jar, with which it ceased.

The upper part of a building on Battery Street, for seventy feet in length, was thrown down, the whole of which was above the cornice, very thin, and the mortar with which it was constructed had not become hardened, being easily removed by the fingers—it more resembled wet sand than a firm mortar.

There appears to have been but little difference in the sensation of persons situated either in upper or basement stories.

It was preceded by a deep, heavy rumbling, and the motion apparently came from the north-west. A distinct shock was felt at eight minutes past two o'clock the same morning, by persons who were awake and up at the time.

The rotatory movement was shown in the fact that small square bottles and boxes that stood upon a line, were moved from their position horizontally, describing an arc of thirty degrees and upwards, as shown by the dust upon the shelves on which they stood.

The first wave came with a force sufficient to project small articles three or four feet on the floor, from shelves on which they were placed; they were apparently all thrown in the same direction. Several clocks were stopped at precisely 5 hours 25 minutes.

All the cracks in walls and ceilings had a direction nearly north-west and south-east, and most of them had the appearance of having been produced at the moment of elevation.

The earthquake was felt heavily at Monterey, at five hours twenty minutes; it was also felt at Bodega, but no time is given.

The vessels on the coast, and ranging from San Pedro on the south to Southern Oregon, and at distances varying from eight to one hundred miles from land, did not experience any shock. They were twenty-two in number.

Up to the present date the most northern point of which we have any record of its having been felt, is at Santa Rosa, which is fifty-three miles north of San Francisco, and at Monterey, ninety miles south of the latter place; to the east of this city we have no record beyond Stockton. This would give for its length one hundred and forty-three miles, and its breadth sixty-six miles.

Inquiry was made through the State line Telegraph at El Dorado, Nevada, Downieville, Placerville, Marysville, Sacramento, Stockton, and San José; it was not felt in any of the localities named, excepting the two last, and at Stockton it was quite light.

If the time as given at Monterey was the same as at this city (San Francisco), the velocity of the earth-wave must have been much slower than that of the great earthquake at Simoda.

March 24th, 22h. 20m.—A slight shock was felt at Canal Gulch, Siskiyou County, also at Yreka. The motion is described as being horizontal.

March 31st, 13h. 25m.—A light shock was felt in San Francisco. It consisted of three light but distinct tremors.

April 6th, 23h. 30m.—A smart shock was felt at Los Angeles and the Monte, people were aroused from their beds.

May 10th, 21h. 10m.—A light shock was felt in San Francisco. The shock was accompanied by a loud report, like the discharge of a cannon; people mistook it for the signal gun of the mail steamer. This was felt at Monterey, and in Contra Costa County.

May 2d, 0h. 10m.—A severe shock was felt at Los Angeles. It caused much trembling among the buildings, and considerable alarm among the people, many leaving their beds. The shock was preceded by two loud reports like the blasting of rock; it apparently came from the north-west; no damage was done.

August 2d, 5h. 20m.—A light shock was felt in San Francisco. It was sufficiently strong to awaken persons in bed; it was evidently more severe in Stockton.

August 27th, 21h. 15m.—An earthquake was felt at Mission San Juan, Monterey County. There were two distinct shocks with short intervals elapsing, the second being the heaviest. The motion is described as undulatory and coming from the west. It was felt at Monterey and at Santa Cruz.

September 6th, 3h.—A smart shock felt at Santa Cruz. It created considerable consternation and many persons left their beds.

September 20th, 23h. 30m.—A very severe shock was felt in different parts of San Diego County, and at that town. At Santa Isabel the ceilings of the dwellings were shaken down; the cattle stampeded and ran bellowing in all directions, and the Indians seemed equally terrified. The walls of the adobe buildings were many of them cracked. The motion is described as oscillatory. A light shock occurred on the following Monday morning.

November 12th, 4h.—A smart shock occurred at Humboldt Bay. Another shock was reported but no date given.

From the record before us it will be seen that of fifteen, the total number of earthquakes recorded during 1856, seven have been felt in San Francisco in common with other parts of the State; seven have occurred south of this locality that were not observed here, and four north of it. Of the seven shocks noticed here five only were not observed in any adjacent district, and may be considered as strictly local. The periods of the year at which the shocks have occurred, are as follows: During the winter months, five; during the autumn, three; during the spring and summer, six. None have taken place between the vernal and autumnal equinoxes.

We have records of considerable and violent volcanic phenomena throughout the northern seas, and islands both to the east and west of Alaska. The Russian frigate *Dwina*, while lying at Shuam Shu, brings intelligence of the outburst of a volcano in that vicinity about the twenty-second of June, and on the twenty-fifth of the same month passed through fields of floating pumice; the latitude by observation being fifty degrees fifty-three minutes, and longitude one hundred and fifty-eight degrees thirty-two minutes east, per chronometer.

An interesting account of a submarine volcano was reported by the Captain of the bark *Alice Frazer*, in latitude fifty-four degrees thirty-six minutes, longitude one hundred and thirty-five degrees west, which is as follows: A portion of the whaling fleet, four in number, were running through the Straits of Ourinack, on the twenty-sixth of July last; while passing the straits a submarine volcano burst out, sending a column of water several hundred feet upward; immediately following this, immense masses of lava were projected into the air, and the sea for miles and for days afterward, was covered with floating fragments of pumice. The ships *Scotland* and *Enterprise* were nearer the volcano than the ships *Frazer* and *Wm. Thomson*; on the decks of the two former considerable pumice, lava, and ashes fell. There were seven vessels in the straits at the time of the occurrence, three of which names I could not learn.

The outburst was accompanied with violent shocks of earthquake. It is the opinion of Captain Newell, of the *Alice Frazer*, that considerable shoaling has been the result of this submarine action.

### ON THE DIRECTION AND VELOCITY OF THE EARTHQUAKE IN CALIFORNIA, JANUARY 9, 1857—BY DR. JOHN B. TRASK.

The earthquake which occurred in various parts of this State, on the morning of the ninth January last excited at the time considerable attention. This arose from two causes. First, from the varied reports that appeared on the following day through the press of the city, detailing its occurrence in remote mountain towns, and for which there was no foundation. Secondly, from the the great extent over which the commotion was felt, as was subsequently proved.

Immediately following the occurrence of the phenomenon, letters were addressed to all the principal towns between Mariposa and Downieville, east of the valleys, for the purpose of learning how far the shocks may have extended eastward of this city. These letters were forwarded by the Pacific Express Company to their agents, and through them answers were returned in every case but two through the same source. From the facts thus obtained, it was found that in no locality east of the foothills, *was any shock felt on that day or night.*

Another report, equally unfounded, reached us on the arrival of the steamer from the southern coast, to the effect that several houses had been demolished in San Diego from its violence, while the facts in the case are *that the steamer left that port twenty-four hours before the shock occurred there.*

This earthquake, or more properly speaking the series of shocks that began on the night of the eighth in this city, and which continued in the south part of the State during the following day and night of the ninth, was probably the most extensive of any on record on this portion of the Pacific coast, excepting, perhaps, that of the wave of the Simoda earthquake in December, 1854. The linear distance over which we are able to trace its course, amounts to six hundred and two miles, and its breadth, so far as now ascertained, is two hundred and ninety miles. It has all the appearance of having been the terminal movement of some more violent commotion at a distance from our coast.

From the best evidence obtainable at present, it seems to have had its origin to the west and traveled in an easterly direction. This is conclusively proved from the fact that it was felt earlier at San Francisco than at any other locality east of this city within the State. We have no record as yet of its occurrence along the coast of Mexico or of Oregon.

I have been able to determine with considerable accuracy the period of time at which the shock between eight and nine o'clock on the morning of the ninth took place, at four localities east of the City of San Francisco, in this State; as the shock at that hour seems to have been more generally noticed than those which either preceded or followed it here or elsewhere, though at this city it was much less marked than the shocks at 1h. 33m., 4h. 15m., and 7h., these three latter occurring at those hours of the morning when most persons are sleeping. The shock at 7h., produced a circular motion in the pendulum, the diameter of which was about five inches. The oscillations of the pendulum in all the others were in an easterly and westerly direction.

The precise period of time at which the shock took place at San Francisco, between eight and nine o'clock, is determined by the stopping of a time-piece belonging to J. W. Tucker, whose rate of error was three seconds fast. The time at San Diego was furnished by Mr. Cassidy, of the army, and that of the Tejon Reserve is by persons at that post. To private gentlemen at Sacramento and Stockton we are indebted for the time at those places. The accompanying table of latitudes and longitudes of localities named, gives the hour at which the shock took place at each; the difference or elapsed time, from which the velocity was deduced, are the mean times corrected for the places named, the time as given above being taken as the standard at San Francisco.

It is proper to state that three minutes four seconds, was the greatest error in time found, and the least was twenty-two seconds:

| LOCALITY. | Lat. | Lon. | Time of shock. | Elapsed Time. | Velocity. |
|---|---|---|---|---|---|
| | ° ′ | ° ′ | h. m. s. | m. s. | miles. |
| San Francisco | 37 48 | 122 25 | 8 13 30 | 0 00 | 0 0 |
| Sacramento | 38 32 | 121 23 | 8 20 00 | 7 30 | 6 6 |
| Stockton | 37 52 | 121 34 | 8 23 00 | 9 30 | 6 5 |
| Tejon | 35 00 | 118 46 | 8 45 00 | 32 30 | 6 0 |
| San Diego | 32 42 | 117 13 | 8 50 00 | 36 30 | 7 0 |

The velocity is given in miles per minute, and by dividing the sum of the same by their number, it will be found that the movement of the wave at that time averages a fraction over 6.2 miles per minute.

The results obtained from the above data approximate closely the deductions of Prof. Bache on the wave which reached our shores and resulting from the earthquake at Simoda on the twenty-third December, 1854, and which will be found in a paper read by that gentleman at the meeting of the American Association for the Advancement of Science, during the early part of last year.

From the facts before us, there can be but little doubt of the direction of the commotion, and that it proceeded from the west, or a little south of that point. The motion of the earth, as described at the different localities at which it was felt, with the motion of the pendulum—which was slightly south of a west line—leads to that conclusion. Time is an important element in aiding us to form corrrect conclusions regarding these phenomena, and it is to be hoped that our friends in different parts of the State, in reporting the same, will be precise in this particular. Of the incidents attending the shocks, many and varied reports have reached us; it seems to have acted with greater violence in the vicinity of the Tejon Reserve and upper Tulare County than at any other place. It is most remarkable that so small an amount of intensity of force was manifested when the area over which it extended is taken into consideration.

The effects were felt in San Francisco several hours before they are reported to have been observed at any other place north or south. They began here at twenty minutes past eleven, on the night of the eighth, and continued till thirteen minutes past eight the following morning—six shocks occurring in the interval; while to the south, the first shock noticed at the Tejon, was at six hours thirty minutes, on the ninth. In Los Angeles they continued at long intervals through the day until twenty-three hours thirty minutes of the same date. I have learned from persons who were present in Los Angeles at this time, and also at the shock of the fourteenth July, 1855, that the severity of the latter exceeded that of the ninth January last past.

## 1857.

During the past year there has been rather a frequency in the occurrence of the phenomena of earthquakes; and, with the exception of two, there have been none that were particularly remarkable either for extent of surface affected or severity of action. In one, that of the ninth of January, the greatest extent of surface, and greatest intensity of action was manifest. Its principal force seems to have been expended in the more southerly portions of our State, and in the immediate vicinity of those volcanic (?) vents found at different localities upon the Colorado Desert. It is manifest, however, that this shock and those which preceded it on the night of the eighth, had their origin to the west of our coast, as the times of occurrence of the shock at different localities most fully prove. This matter was fully discussed in my previous paper, "On the direction and velocity of the earthquake of January 9th, 1857," read before this Society March 30th, which will be found in their proceedings.

The other shock of greatest extent, on the second of September, extended over an area of about two hundred miles, but was marked by no particular severity or injury, except that of fright to those who experienced it.

The whole number that can be authenticated as occurring during 1857, amounts to seventeen, being greater than the number recorded in 1853 and 1856; and it would seem probable from our records that this number is the maximum to which we shall probably be subjected in this State.

From the Sandwich Islands we have no news of earthquakes save one, which is here inserted: "A very severe shock of earthquake was felt at Kawaihae, Hawaii, on the twenty-fourth of February, the most severe that the residents there have had for many years."

The arrival of the whaling fleet from the Northern seas brings no intelligence of the occurrence of these phenomena, as was the case of the preceding year;

hence, the presumption is, that subterranean action has not been violent in those distant regions during the year just passed.

On the coast of Mexico, and inclusive between the twenty-fifth and thirty-second parallels, we have received intelligence of the occurrence of one earthquake, which appears to have been felt on both shores of the Gulf of California for a distance of nearly two hundred miles, both north and south. We have no records south of that point.

The shocks which we can authenticate within the limits of our own State, are as follows:

January 9th.—This shock was felt from Sacramento to the southern boundary of the State. It was preceded by three smart shocks the night and morning previous. At Santa Barbara water was thrown over the surface from a shoal well, seven feet deep, the water in which was less than three feet in depth.

January 18th, 9h.—A light shock at Martinez and Benicia.

January 20th, 8h. 30m.—A smart shock was felt at Santa Cruz and Mission San Juan.

January 21st, 23h.—On the evening of this day a smart shock was felt at Mariposa. The wave and sound seemed to travel from north-west to south-east. It was accompanied with a report like that of a distant gun.

February 5th, 7h.—A smart shock was felt in San Francisco, which shook the buildings that are situated on made-ground very severely, while those situated on firmer bottoms were affected. This shock was felt at Oakland and Stockton, but was not felt at San José or Sacramento, as reported at the time.

March 14th, 15h.—A severe shock was felt at Santa Barbara and Montecito. It was momentary in duration, attended with a loud report.

March 23d, 12h. 27m.—A light shock in San Francisco.

May 3d, 22h.—A smart shock at Los Angeles and the Monte.

May 23d.—A light shock at Los Angeles; a report also that a severe shock had been felt at Fort Tejon.

June 14th.—A shock was felt at Humboldt Bay. On the same day several severe shocks were experienced at the Penal Island (Carmen), Gulf of California, and which extended almost ninety miles north and south of the island.

August 8th, 11h.—A smart shock was felt at Rabbit Creek, Sierra County.

August 29.—A severe shock at the Tejon Reserve. No time is given.

September 2d, 19h. 45m.—A light shock at San Francisco. This shock was felt at Sacramento, Marysville, Nevada, San Juan, Downieville, and Camptonville.

September 14th, 2 P.M.—A light shock in San Francisco.

October 19th, 18h. 30m.—A severe shock of an earthquake in San Francisco.

October 20th, 12h. 8m., 12h. 35m., and 13h. 15m.—Three other shocks occurred; the last was equally severe with that of January 9th, at 8 A.M. People were much frightened, and left their beds. The shock was felt at San José, but not at Oakland.

November 8th, 8h. 45m.—A shock at San Francisco, which was felt at Oakland and Bodega.

December 23d, 7h.—A light shock at San Francisco.

Of the whole number which have occurred during the year, two only have been felt at San Francisco that were not experienced at other localities, and four others have occurred which have been felt in common at other portions of the State—thus making about one-third of the whole number that were in common here and elsewhere.

Eight of the aggregate have occurred between the summer and winter solstices.

Seven have occurred during the spring and summer months, and ten during the winter and autumn.

Eight have occurred between the vernal and autumnal equinoxes.

## 1858.

During the past year we have had occasion to note the occurrence of eight shocks of earthquake in this State. This number is one-half less than that in 1857, and one-third less the number in 1856. The shocks, with one exception, have been unmarked by anything like violence, being little else than mere vibrations or tremors, not noticeable by the great majority of the people. They are as follows:

February 10th.—A smart shock at Kanaka Flat, Sierra County. No time noted.

February 15th, 4h. 20m.—A light shock in San Francisco. Was observed in the County of San Mateo ten miles south of the city.

August 19th, 22h. 10m.—A light shock in San Francisco. The motion was east to west, and was undulatory.

September 2d.—A smart shock at Santa Barbara, no time given.

September 3d, 0h. 40m.—A smart shock in San José. This shock was felt at Santa Cruz, twenty-five miles west, and was evidently more marked in strength at that locality. No damage.

September 12th, 19h. 40m.—A smart shock at San Francisco. The motion was from north to south. There were two vibrations with undulatory movements lasting about fifteen seconds.

September 26th, 1h. 26m.—A light shock at San Francisco.

November 26th, 0h. 24m.—A heavy shock at San Francisco. This shock was by far the heaviest during the year, it awoke most people from slumber and created no little alarm; persons left their beds and sought cooler situations with less attire than is usually worn. The iron pillars in the second story of the custom house have separated from the ceiling above about half an inch, and are supposed to have settled from the effects of the shock; I much doubt the alleged cause of this displacement, as the pillars below present no indication of similar disturbance. This shock was felt at Oakland ten miles east of the city, but was not felt at Stockton, Sacramento, nor Marysville. It was evidently confined to an area of ten or twelve miles.

## 1859.

January 25th, 20h. 20m.—A heavy shock of earthquake was felt in Trinity and Shasta counties. It was felt at Weaverville, Shasta, and Horsetown.

April 4th, 13h.—Quite a severe shock was felt at San José. There were several vibrations, apparently from north to south.

August 10th, 22h. 35m.—A smart shock was felt in this city (San Francisco).

September 26th, 6h. 10m.—A smart shock at San Francisco.

October 5th, 13h. 18m.—A very smart shock at San Francisco.

November 27th, 19h. 15m.—A light shock at San Francisco.

December 1st, 0h. 50m.—A smart shock at San Francisco. Felt at Oakland and Benicia.

December 1st, 14h. 10m.—Several successive shocks were felt at San Bernardino; several of them were quite heavy, causing much alarm. No damage was done.

Whole number of shocks during this year was eight.

## 1860.

During the year last past this portion of the Pacific coast has been but little disturbed by earthquakes. There have been but three during this period that can be well authenticated, and one, viz.: December 21st, whose character is somewhat doubtful.

The shocks that have occurred are as follows:

March 27th.—A severe shock was experienced at Los Angeles and vicinity, which was not productive of any damage to person or property. No time is given in the account.

March 15th, 11h.—A violent shock was experienced at Sacramento; the wave passed through the counties of Placer, Nevada, El Dorado and Plumas. At Iowa Hill the church bells were rung, also at Sacramento. At the latter place and at Forest City, clocks, in many of the buildings, were stopped. This earthquake extended to the eastern base of the Sierra Nevada. At Carson City it occurred at 10h. 45m. and very violent; goods were shaken off the shelves in many of the stores, and a general panic and stampede prevailed.

November 12th.—A smart shock was felt at Humboldt Bay and its vicinity, but no damage was done.

December 21st, 6h. 30m.—At San Francisco a series of light vibrations of the earth occurred, which continued with but two remissions for the space of half an hour. These vibrations were not perceptible to persons in the building otherwise than by mercurial column, which was equal to seven inches of the barometer, and was the mercury gauge of an air pump that had remained stationary at twenty-four inches for the space of four hours. At this time the column in the gauge began to show much disturbance by oscillating up and down in a very rapid manner without any apparent cause; the stop screws (Faraday's) were all tried at the moment and found perfectly tight as they had remained for hours previous.

The oscillations were watched carefully by Mr. J. Roach and myself for half an hour, at which time they ceased. The maximum of the mercury column was a fraction over an inch, which was attained through vibrations of one-fourth to one-eighth of an inch rapidly repeated and continuous, and as gradually, through a series of lighter vibrations, the displacement would diminish and the column subside to its former level; this was three times repeated, the column at no time being at rest. The period of time occupied by the column in reaching its maximum of disturbance each time was from eight to twelve minutes. There was no apparent cause for this disturbance, unless it be attributable to a series of light vibrations of the earth occurring in a vertical direction, and to that cause I am disposed to assign it.

The passing of carriages on the street did not affect these vibrations of the column, for they continued in the same manner when those vehicles were not passing. While the oscillations were going on, I took a sledge and struck some half a dozen blows on an anvil block in the workshop, which did not make any perceptible difference in the movements of the column; after it had come to rest, the same experiment was repeated, but the column did not in any manner react to the concussion thus produced.

## 1861.

During 1861 there has been but one earthquake recorded in the State.

July 4th, 16h. 11m.—A severe shock of earthquake occurred at San Francisco. It consisted of three distinct waves following each other in very rapid succession. Its effects to the east of the city in the San Ramon Valley were more severe. Near the house of Mr. Larabie it opened a large fissure in the earth. In the vicinity of Mr. Porter's it opened a new spring of water, and a small running stream was also caused near Mr. Hunt's. For several days after, light shocks were repeated at intervals.

## 1862.

September 29th, 15h. 5m.—A very smart shock of earthquake at San Francisco. This was felt at Petaluma.

December 23d, 20h. 19m.—A smart shock at San Francisco.

## 1863.

During the year 1863 we have had five earthquakes, and unmarked by any serious event.

January 25th, 2h. 20m.—A severe shock was experienced at San Diego, continuing from five to eight seconds. There was no undulation in this instance, the shock consisting of a series of sharp jars. It was preceded by a profound rumbling sound.

February 1st, 16h. 1m.—A very smart shock at the Mission San Juan, Monterey County. At Gilroys the shock was felt (or another) fifteen minutes later. The latter town is near twelve miles east of the Mission. At both localities the motion was undulatory. The shock was not felt at Monterey, twelve miles west of San Juan.

June.—A smart shock at San Francisco.

July 15th, 10h. 19m.—A smart shock at San Francisco.

August 1st, 11h. 6m.—Two light shocks at San Francisco about one hour apart.

December 19th, 12h. 38m.—A very smart shock was felt throughout the city; directly afterwards another and more severe one occurred. The first was a sharp, sudden jar, the second undulatory. The accuracy of the telegraph operator at Santa Clara enables us to form a correct idea of the course of this wave. His time was 14h. 44m. 31s., and within twenty-nine seconds of true time. The elapsed time is 7m. 31s., and gives for the direction of the seismic wave a course north and south (in lieu of east and west in my first notice which was thus in error.) I take this opportunity to express the thanks of the Academy to this operator for his accuracy and kindness in furnishing us dates in this and other phenomena of scientific and public interest.

The figures derived from our statistics furnish us the following interesting results as to the frequency of shocks in one season of the year more than in another. The tables below furnish the details.

It is found from these figures that during the thirteen years ending December, 1863:

*First.* The number of days on which earthquakes have occurred, is one hundred and ten.

*Second.* The month in which the greatest number have occurred is January, being sixteen; and the months in which the least number have occurred, is April and February, the sum of each being six.

*Third.* The winter months have given the largest number in the aggregate, the sum being thirty-four. The summer months the smallest number; their sum being twenty-three. The spring months have given twenty-four, and the autumn months twenty-nine.

*Fourth.* The number of shocks between the equinoxes foot up thus. Between the autumnal and vernal equinoxes the sum is sixty-four; between the vernal and autumnal equinoxes, the sum fifty-two.

*Fifth.* The number of shocks that have taken place between the solstices stand thus. From the winter to the summer solstice the sum is fifty-four. From the summer to the winter solstice, the sum is fifty-nine.

TABLE 1.—*Giving the number of shocks in each month of the year, for thirteen years.*

| TABLE. | 1850 | 1851 | 1852 | 1853 | 1854 | 1855 | 1856 | 1857 | 1858 | 1859 | 1860 | 1861 | 1862 | 1863 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan.... |  |  |  | 1 | 1 | 2 | 5 | 4 |  | 1 | 1 |  |  | 1 | 16 |
| Feb.... |  |  |  | 1 |  | 1 | 1 | 1 | 1 |  |  |  |  | 1 | 6 |
| March.. | 1 |  |  | 1 | 2 |  | 2 | 2 |  |  | 1 |  |  |  | 8 |
| April... |  |  |  | 2 | 1 | 1 | 1 |  |  | 1 |  |  |  |  | 6 |
| May.... | 1 | 3 |  |  | 2 |  | 2 | 2 |  |  |  |  |  |  | 10 |
| June.... | 1 | 1 |  | 1 | 1 | 1 |  | 1 |  |  |  |  |  | 1 | 7 |
| July.... |  |  |  | 1 | 1 | 2 |  |  |  |  |  | 1 |  | 1 | 7 |
| August. | 1 |  |  |  |  | 1 | 2 | 2 | 1 | 1 |  |  |  | 1 | 9 |
| Sept. ... | 1 |  |  | 1 | 1 |  | 2 | 2 | 4 | 1 |  |  | 1 |  | 13 |
| October |  |  |  | 2 | 2 | 2 |  | 1 |  | 1 |  |  |  |  | 8 |
| Nov. ... |  |  | 1 | 2 |  |  | 1 | 1 | 1 | 1 | 1 |  |  |  | 8 |
| Dec. ... |  | 2 | 1 | 1 |  | 2 |  | 1 |  | 2 | 1 |  | 1 | 1 | 12 |
| Total. | 5 | 6 | 2 | 13 | 11 | 12 | 16 | 17 | 7 | 8 | 4 | 1 | 2 | 6 | 111 |

TABLE 2.—*Number of shocks occurring between the dates of the equinoxes and solstices, for thirteen years.*

| TABLE. | Sept. 20th to March 20th. | March 20th to Sept. 20th. | Dec. 21st to June 21st. | June 21st to Dec. 21st. |
|---|---|---|---|---|
| 1850 | 1 | 4 | 2 | 3 |
| 1851 | 2 | 4 | 5 | 1 |
| 1852 | 2 |  |  | 2 |
| 1853 | 10 | 5 | 8 | 7 |
| 1854 | 5 | 7 | 6 | 6 |
| 1855 | 8 | 4 | 4 | 8 |
| 1856 | 7 | 9 | 9 | 7 |
| 1857 | 9 | 8 | 8 | 9 |
| 1858 | 4 | 3 | 3 | 5 |
| 1859 | 6 | 2 | 2 | 6 |
| 1860 | 4 |  | 3 | 1 |
| 1861 |  | 1 |  | 1 |
| 1862 | 1 | 1 | 1 | 1 |
| 1863 | 3 | 3 | 3 | 3 |
| Total | 64 | 52 | 54 | 60 |

I regret that my records of the occurrence of earthquakes upon the east coast of the United States is not more complete than it is, and also that it does not extend through an equivalent period of time as our own, from 1850 to date; but I have no authentic records of their occurrence on the other side later than 1854; my business at that time, and the subsequent period that has elapsed, being such that I was not able to maintain their continuation. In order to prove the statement made on a preceding page correct as to our relative immunity on this coast over equal extent of territory, I here subjoin the totals on both coasts during that period of time. This statement will also include those shocks which were matters of record belonging to the West India Islands, and which properly belong to the eastern-coast series.

The figures relating to this matter, stands thus:

In California during 1850, five shocks; 1851, six shocks; 1852, two shocks; 1853, thirteen shocks; 1854, eleven shocks. Total, thirty-seven shocks.

In United States, east coast. 1850, three shocks; 1851, seven shocks; 1852, ten shocks; 1853, thirteen shocks; 1854, eleven shocks. Total, forty-four shocks.

Balance against east coast, seven shocks.

West India Islands. 1852, seven shocks; 1853, three shocks; 1854, one shock. Total, eleven shocks.

These inclusive with the continental series foot up eighteen days on which shocks occurred in excess of this coast during the same period of time, and thus shows a margin of greater frequency of little more than thirty per cent.

## ERRATUM.

Page 131, line 16 from bottom, for "an oven" read "or even."

## Regular Meeting, May 2d, 1864.

Dr. Trask in the Chair.

Eleven members present.

Donations to the Cabinet: Specimens of dried plants, the types of species lately described in these proceedings by Prof. Gray.

Mr. Brewer presented for Mr. Gabb the following paper:

### On Cretaceous Fossils from Sahuaripa Valley, State of Sonora, Mexico, discovered by August Remond

BY W. M. GABB.

Mr. Rémond announced in a letter to me, the discovery of fossiliferous rocks about a league and a half east of Arivechi, Sahuaripa Valley, Sonora, Mexico. The fossils occur in a clay slate, and are in a fine state of preservation. He says: "The shales rest on sandstones, barren of fossils; feldspathic porphyries protrude through them, but no alteration of the beds were observed at the points of contact. Even the lamination of the fossiliferous strata has not been disturbed, and shells are found but a few millimetres from the porphyry." He adds that the fossil bearing strata may attain a thickness of four or five hundred feet. The shales are overlaid by thick strata of compact blueish limestone. The strata dip to the south-east with an inclination of from thirty to fifty degrees, and form the first range of foot-hills of the Sierra Madre.

I have identified the following species on a hasty examination, proving conclusively the cretaceous age of the formation. It is an interesting fact, that the fossils indicate a closer relationship to the eastern deposits than to those of California.

Turritella seriatim-granulata Roem. Cardium Tippanum? Con. Chemnitzia (?) gloriosa Roem. Trigonia Evansii? Meek. Neithea quadricostata Sow. Exogyra Texana Roem. Turbinolia Texana Con.

---

## REGULAR MEETING, MAY 16th, 1864.

President in the Chair.

Fourteen members present.

Rev. Mr. Neri, of Santa Clara, was elected a corresponding member.

Donations to the Cabinet: Volcanic cement, from Sierra County, containing fossil wood; also a magnesian mineral, from a cavity in a quartz vein near Nebraska, Sierra County. Mr. Clayton stated that when found it was gelatinous, semi-transparent, and mixed with loose quartz crystals; but on drying it shrank greatly in bulk and became fibrous, like fine Asbestos. The miners say that it is not uncommon in that locality.

Seeds of a large Melon Cactus, from the Colorado deserts; also seeds of a fine nutritious "bunch grass," from the dry foot hills near Fresno river, by Mr. J. E. Clayton.

Mr. Brewer stated that he had obtained further information regarding the coal brought before the Academy Feb. 15th, by Prof. Blake. On the authority of J. Ross Browne and another gentleman, he had learned that no coal occurs in the locality near the Colorado River then mentioned, and that the specimens were English coal carried up the river by speculators for the purpose of swindling the public by selling stock in a fictitious coal mine.

---

## REGULAR MEETING, JUNE 6th, 1864.

President in the Chair.

Nine members present.

Donations to the Cabinet: A piece of sandstone resembling in shape a human foot, by Mr. Ed. Webber.

Donations to the Library: American Journal of Science and

Arts for March, 1864, from the editors. Observations on the Genus Unio, by Isaac Lea, L.L.D., Vol. 10. How to collect and observe Insects, by H. S. Packard, Jr. Plants of Buffalo, N. Y. and its vicinity, by G. W. Clinton. Bulletin of the Museum of Zoölogy of Cambridge, Mass. pp. 29—60. Report of contributions to the Pennsylvania Relief Association for East Tennessee. Proc. of the Acad. Natural Sciences of Philadelphia from October to December, 1863, and January and February, 1864. Contributions to the Physics, etc. of the Sacramento River, by Thos. W. Logan, M.D., extracted from the Pacific Medical and Surgical Journal, Vol. 7, 1864,—from the author.

### REGULAR MEETING, JUNE 20th, 1864.

President in the Chair.

Eleven members present.

C. W. M. Smith and Dr. McClure, of Redwood City, were elected resident members.

Donations to the Cabinet: A large crab, from the west coast of Mexico, by G. O. Haller, through Dr. Cooper.

Donations to the Library: Report of the Smithsonian Institution for 1862.

### ADJOURNED MEETING, JULY 11th, 1864.

Dr. Trask in the Chair.

Seven members present.

The following paper was received from the author, in accordance with the proposition accepted by the Academy Dec. 7th, 1863.

## Descriptions of New Marine Shells from the Coast of California.

PART I.

BY PHILIP P. CARPENTER, B.A., PH.D.

*Corresponding Member of the Academies of Philadelphia and California, etc.*

WARRINGTON, ENGLAND, May 4th, 1864.

The shells to be described in these papers were collected by Dr. J. G. Cooper, for the State Geological Survey of California. Being aware that I was engaged in preparing descriptions of the shells of the Smithsonian collections, to serve as a handbook on the Mollusca of the western coast, and also (at the present time), a "Supplementary Report on the present state of our knowledge of the Mollusca of the west coast of North America," for the British Association; he has very obligingly transmitted to me such duplicates as could be spared from the State collection for identification.

### CALLIOSTOMA Swainson, 1840.

*Calliostoma formosum* Carp. n. sp. State Collection, Species 615 a.

C. t. subelevatá, brunnescens, fusco-purpureo nebulosa, anfr. vii. valde tumentibus, suturis impressis; carinis majoribus in spirâ duabus, gemmatis, interdum brunneo huc et illuc tinctis; serie granulorum minorum prope suturam; serie quartá minimorum inter duas carinas; lirulis basalibus circ. ix., fusco maculatis; interstitiis à lineis incrementi corrugatis; apertura subquadratá. Long. 0.47, long. spir. 0.34, lat. 0.43, div. 68°.

*Hab.* San Pedro five; San Diego four dead on beach at low water—very rare. It is well distinguished by the two principal necklaces, with smaller rows intercalating. In coloring it resembles C. eximium Reeve. (versicolor Menke, Mazatlan Catal.). from the Gulf of California.

*Calliostoma splendens* Carp. n. sp. State Collection, Species 530 a.

C. t. parvâ, latiore, tenuiore; exquisité rufo-castaneo et purpureo, interdum intensioribus, et livido, varie nebulosâ et punctatâ; anfractu primo nucleoso diaphano, granuloso, apice mamillato; dein iv. normalibus, subtabulatis; primo costibus spiralibus ii. acutis, valde expressis, alterâ parvâ suturali; anfr. penult. costis iii. quarum media extantior, superior subgranulosa; anfr. ult. aliis intercalantibus, supra peripheriam v. quarum tertia magis extans; interstitiis à lineis incrementi vix decussatis; costâ circa peripheriam angulatam conspicuâ; basi costulis rotundatis, haud extantibus, peripheriam et axim versus conspicuis, medio sæpe obsoletis; basi nitidâ, subplanatâ; aperturâ subquadratâ, intus carneo-nacreâ, valde splendente: operculo tenuissimo, levissimo, pallido, diaphano, concavo; anfr. circ. x. crebris, parum definitis.

Long. 0.23, long. spir. 0.15, lat. 0.24, div. 87°.

*Hab.* Monterey, 20 fms. dredged 2, dead; Santa Barbara, in roots of kelp growing in about 10 fms. 13, dredged in 16 fms. 2, dead; S. B. Island, 2, dead, on beach; Catalina Island, 30–40 fms. 2, alive; San Diego, 1, dead.

The specimens here described are probably mature, and are well marked in character. The painting is richly lustrous, of a fleshy nacre inside; outside, of a rich orange-chestnut or red, variously laid on a light ground, sometimes with streaks of nacreous purple, often with dots on the ribs. The operculum is extremely thin and transparent.

### SOLARIELLA Searles Wood, 1843.

*Solariella peramabilis* Carp. n. sp. State Collection, Species 1025.

S. t. tenuissimâ, elegantissime sculptâ, lividâ, rufo-fusco pallide maculatâ; anfr. nucl. ii. valde tumidis, lævibus, apice mamillato; dein anfr. norm. iv. tabu-

latis, suturis fere rectangulatis, supra spiram bi- seu tri-carinatis, carinulis aliis postea intercalantibus; totâ superficie elegantissime et creberrime radiatim lirulatâ, lirulis acutissimis, extantibus, supra carinas subgranulosis, interstitia anfr. primis fenestrantibus, postea decussantibus; basi valde rotundatâ; carinulis circ. v., anticâ granulosâ, sculptâ; umbilico maximo, anfractus intus monstrante, lineis spiralibus circ. iii. distantibus, et lirulis radiantibus à basi continuis, concinne ornato; aperturâ rotundatâ, à carinulis indentatâ, vix parieti attingente, intus iridescente, nacreâ: operculo tenuissimo, multispirali, anfr. circ. x., radiatim eleganter rugulosis.

Long. 0.38, long. spir. 0.19, lat. 0.42, div. 85°.

*Hab.* Catalina Island, 30–120 fms. 20, both alive and dead.

The name *Solariella*, given to a crag fossil (tertiary) species by Searles Wood, which he afterwards reunited to *Margarita*, is here used as a subgenus, in the author's sense, for *Margaritæ* with large crenated umbilicus. This is one of the many instances in which the North Pacific fauna carries out the ideas of the English crag. Unfortunately, the name appears in Add. Gen. I, 431, for a subgenus of *Monilea*, with which these shells have only a limited affinity; and, accordingly, the true *Solariellæ* have been reconstituted as part of *Minolia*, A. Ad. That gentleman, however, fully accords with the present arrangement. The *Solariellæ* are known from *Trochiscus*, and from all forms of *Solariadæ*, by the normal (not inverted) nuclear whirls; and from the Solarids, by the nacreous texture.

Dr. Cooper's very lovely species of a very lovely group may possibly prove to be a variety of the Japanese "*Minolia aspecta* A. Ad." ms. in Mus. Cuming; but, until more specimens from each district have been compared, it is more prudent to keep them separate. It seems to have exhausted the powers of sculpture on its graceful habitation. Under the microscope, the sharp transverse lirulæ, mounting over the keels, dividing the interspaces, and even ascending the wide umbilicus, are eminently beautiful. Even the operculum is sculptured with delicate waved radiating lines. It has the aspect of an extremely thin *Torinia*, with a funnel-shaped umbilicus. This is not only bounded by a granular keel, but has three other distant spiral lines crossing the lirulæ. The radiating sculpture is more distant on the upper whirls, where first two, then three keels appear, fenestrated by the lirulæ, which afterwards become much closer, and are sometimes worn away behind the labrum.

### MARGARITA Leach, 1819.

*Margarita acuticostata* Carp. n. sp. State Collection, Species 354.

M. t. *M. lirulatæ* simili; parvâ, tenui, albido-cinereâ, olivaceo-fusco varie maculatâ, seu punctulatâ; anfr. nucleosis ii. lævibus, tumidis, fuscis, apice mamillato; anfr. norm. iii. tumidis, tabulatis, suturis rectangulatis; carinis acutis in spirâ iii., quartâ peripheriali, æquidistantibus; interstitiis spiraliter striatis; in spirâ et circâ basim radiatim creberrime striulatis; basi subrotundatâ, lirulis distantibus circ. ix. ornatâ; umbilico magno, infundibuliformi, vix angulato, intus interdum striis spiralibus paucis sculpto; aperturâ subrotundatâ, pariete parum attingente: operculo anfr. paucioribus, circ. vi. suturis subelevatis.

Long. 0.18, long. spir. 0.12, lat. 0.19, div. 87°.

*Hab.* Santa Barbara, in kelp-root, 2, dead; Catalina Island, 8–10 fms. 20, some alive; Monterey, 20 fms. 4, dead.

This shell might be taken for a delicate form of *Gibbula parcipicta*, which in painting it exactly resembles. It is known from the Vancouver *M. lirulata* by the three sharp keels on the spire, between which there are no others intercalating, and by the details of sculpture. The patches of color are very variable, sometimes scarcely appearing; and are generally deeper tinted on the keels, giving a false appearance of granulation.

### *Margarita salmonea* Carp. (? var.) State Collection, Species 352.

M. t. inter *M. undulatæ* et *M. pupillæ* intermediâ; minore, spirâ satis elevatâ; anfr. nucl. iii. purpureis; dein iv. normalibus, colore salmoneo; liris spiralibus in spirâ viii., quarum ii. suturales, minimæ; suturis haud undulatis; interstitiis à lineis incrementi creberrimis, haud elevatis, sculptis; basi lirulis creberrimis, æqualibus, circ. xviii. ornatâ; aperturâ subquadratâ; umbilico minore, angulato: operculo tenuissimo, diaphano, anfr. circ. x. vix definitis.

Long. 0.22, long. spir. 0.14, lat. 0.22, div. 80°.

*Hab.* Monterey, 6–20 fms. 5, alive; Catalina Island, 30–40 fms. 2, alive.

This shell differs from the common *Margarita* of the Vancouver district (*M. pupilla* Gld.=*calliostoma* A. Ad.), in its much deeper and salmon-tinted hue; its finer sculpture, absence of decussation, and want of distant liræ round the umbilicus. From the Norwegian specimens of *M. undulata* it is known by the absence of sutural waves, and by the finer basal riblets, of which the interstices are minutely sculptured across. The operculum differs from both, in its great thinness and smoothness. Additional specimens may better display its true relations.*

## LIOTIA Gray, 1842.

### *Liotia fenestrata* Carp. n. sp. State Collection, Species 1006.

L. t. parvâ, primum subdiscoideâ, postea variante, albido-cinereâ; anfr. nucl. lævibus, planatis, apice depresso; anfr. norm. ii. et dimidio, convexis; clathris validis distantibus circ. xv. radiantibus, et vii. spiralibus, subæquantibus, conspicue fenestratâ; aperturâ circulari, sæpius plus minusve declivi, parieti vix attingente; umbilico maximo, anfractus monstrante; labio, regione umbilicari, sinuato.

Long. 0.09, long. spir. 0.04, lat. 0.12, div. 170°.

*Hab.* Catalina Island; beach to 40 fms. 20, dead.

This strongly sculptured species varies greatly (in the two specimens sent to the Smithsonian Institution), in the declivity of the mouth and consequent size of the umbilicus, where the labium is, as it were, scooped out.

---

* Specimens from Monterey, and one from the beach of the Farallone Islands, are intermediate between that described by Mr. Carpenter (Catalina Island specimen) and the northern *M. pupilla*. J. G. COOPER.

*Liotia acuticostata* Carp. n. sp. State Collection, Species 519 a.

L. t. parvâ, subglobosâ, albâ; anfr. nucl. ii. lævibus, apice satis extante; anfr. normalibus iii., carinis in spirâ maxime extantibus ii., anfr. ult. vi.; suturis subrectangulatis; aperturâ circulari; labro extus parum contracto; labio conspicuo; umbilico haud magno.

Long. 0.12, long. spir. 0.06, lat. 0.10, div. 95°.

*Hab.* Catalina Island, 10–20 fms. 4, alive; Monterey, 4, dead, dredged?

This pretty little Cyclostomoid species is easily recognized by the sharp revolving keels, and absence of radiating sculpture.

### AMYCLA H. & A. Adams, 1858.

*Amycla undata* Carp. n. sp. State Collection, Species 1067.

A. t. parvâ, rufo-fuscâ, turritâ, epidermide tenui indutâ; marginibus spiræ subrectis; anfr. nucleosis iv. lævibus, tumidis, apice mamillato; anfr. normalibus v. valde tumidis, suturis impressis; costis radiantibus ix. valde tumidis, latis, antice et postice obsoletis; interstitiis undatis; liris spiralibus acutioribus, distantibus, costas superantibus, secundum interstitia eleganter undulatis, quarum vi.–viii. in spirâ monstrantur; aperturâ ovali, in canalem brevem rectam productâ, intus haud liratâ; labro acuto, labio acuto extanti ad suturam juncto; columellâ planatâ: operculo nassoideo. ?

Long. 0.44, long. spir. 0.20, lat. 0.20, div. 45°.

*Hab.* Catalina Island, not rare, 30–40 fm. 10, some alive.

The nuclear whirls in this shell resemble a minute *Paludina.* The only operculum in the specimens sent was broken in extraction, but appeared to be Nassoid. The sculpture consists of elongate knobs swelling in the middle; with spiral lines hanging as it were from pier to pier, as in a suspension bridge. The aperture is somewhat Columbelloid, the inner and outer lips joining at the suture; but neither are lirate within, although they have that appearance from the outside sculpture showing through.

## REGULAR MEETING, JULY 18th, 1864.

President in the Chair.

Nine members present.

Donation to the Cabinet: Specimens of native Sulphur from San Buenaventura, by Mr. Spence.

Donations to the Library: Annual Report of Harvard College, Mass. Report of the Insane Asylum of California. Prospectus of the Santa Clara College. Proceedings of the Essex Institute, Vol. 4, No. 1. American Journal of Science and Arts, May,

1864. Public Documents from Senator Conness. Geographie Botanique Raisonée, by Alph. DeCandolle, from the author.

Dr. Cooper stated that he had lately learned from Mr. Gill, of the Smithsonian Museum, that the genus AYRESIA, lately described in these Proceedings, is identical with CHROMIS, of Cuvier, though not *Chromis* of Richardson, with which Dr. C. had compared it. The name of the fish must therefore be changed to CHROMIS PUNCTIPINNIS, Cooper.

Col. Ransom presented, on behalf of Mr. John Wilson of this city, some Indian relics, from the State of Chihuahua, Mexico, accompanied by a letter of which the following is an abstract:

> The relics consist of part of a foot and hair from different mummies, a string of beads made of bone, with a few of blue stone, also part of a belt and tassel, and a piece of very strong cloth of vegetable material. These were found by Mr. Wilson in a cave situated on the western slope of a very high mountain of the Sierra Madre, which seems almost to hang over the ancient Pueblo of Chiricahui—a name signifying the Mountain of Bones. This Pueblo was occupied by the Spaniards soon after the conquest by Cortez; and from previous traditions it is supposed by the inhabitants that this cave, and another on the opposite side of the valley, had been used as a place of burial by the natives for several hundred years. It is supposed that no bodies have been deposited there for the past hundred and fifty years, and perhaps longer.
>
> On visiting the cave, Mr. Wilson found an excavation in the floor made three or four years since by some persons digging for saltpetre-earth, partly filled in, but still several feet deep; and exposed at the sides of this pit were several rows of bodies placed in regular order one above another, in a remarkable state of preservation. They were in a compact position, the knees bent up to the chin, and the face drawn back close to the buttocks, then securely sewed up in the remarkably strong and well-woven cloth here presented, which, on all of the four or five bodies examined, showed the same degree of strength and perfection. Over this was another covering of palm-leaves also sewn closely together. The bodies were dried and shrunken, but retained their form and integuments. Under each body were two small sticks, on which the body was laid on its back, the feet towards the mouth of the cave.
>
> The circumference of the cave was about a hundred feet, and the height above the floor, thirty or forty feet.
>
> Mr. Wilson and his companions "came to the very decided conclusion," that the floor of the cave, for a depth of twenty feet or more, was formed of bodies similarly arranged in layers which had been placed there from time to time, as they died, and covered with earth and pebbles from the sides of the mountains. There can be no doubt that a thorough exploration of these relics would reveal very much of the lost history of the Indian tribes of Mexico, and richly reward the labors of the antiquarian. The excellent material of the cloth in which

the bodies were sewn up, surpassing in texture and strength anything now manufactured in Mexico, is worthy of investigation, as it may still be found valuable for making bags, sails, etc. There was no sign of any embalming substance by which the bodies and cloth could have been preserved, and the only explanation suggested by Mr. Wilson is that it is due to the dryness of the atmosphere, and the saltpetre contained in the earth. He also suggested that the fibres of the cloth may have been derived from the "Maguey," (Agave Americana) or some allied plant.

Dr. Cooper remarked that the condition of the foot was very similar to those of the Indian Mummy presented to the Academy by Dr. J. B. Stout, January 21st, 1856, and which had been dried by the action of the air, while protected from the weather by a cedar canoe inverted over another containing the body. That was in the moist climate of Shoalwater Bay, north of the Columbia river, and Dr. Cooper who was present at the time the body was removed by Capt. Russell in 1854, was a witness of the fact that no preservatives had been found with it. He also stated that the Indians of the vicinity could not tell how long it had been there, though certainly not a hundred years.

---

## Regular Meeting, August 1st, 1864.

President in the Chair.

Eleven members present.

Donations to the Cabinet: A box of fossils from Eureka, Humboldt Bay, by Dr. Chamberlin. Fossils from Catalina Island, by Mr. J. E. Clayton.

Donations to the Library: Silliman's Journal for July, 1864, by the Editors. A Description of Adiantum Jordani, C. Muell of Halle, by R. Jordan, of Halle, Prussia.

---

## Regular Meeting, August 15th, 1864.

President in the Chair.

Three members present. Mr. Miller as a visitor.

Donations to the Cabinet: California Mosses, lichens and liver-mosses, by Mr. H. N. Bolander.

---

## REGULAR MEETING, SEPTEMBER 5th, 1864.

Vice-President, Dr. Eckel in the Chair.

Nine members present. Prof. B. Silliman, Jr., Dr. Eichler, and Mr. Ehrenberg as visitors.

Donations to the Cabinet: A specimen of a wild cherry from Catalina Island, by Mr. J. E. Clayton. A collection of plants from Washoe, by Mr. Bloomer.

Prof. B. Silliman remarked that in his recent visit to Arizona, east of the Mohave, he had seen what he presumed were the morains of former glaciers on the eastern flanks of some of the mountain ranges. They consist of rudely stratified materials both angular and round, mingled confusedly together and forming terrace-like spurs or embankments radiating outwards from the curved range and appearing to have been left there by glaciers, though no glacial polishing and scratching of the rocks could be seen as in the Sierra Nevada opposite Mono Lake and elsewhere. These evidences of glaciers in Arizona were nearly under the 35th parallel of latitude, and he believed that no evidence of glacial action had before been observed on the Pacific slope at a point so far south.

Prof. W. P. Blake observed that this was certainly the first observation upon glacial phenomena in Arizona, and that he had noted evidences of former glaciers in the Sierra Nevada, as far south as the Tejon Pass, lat. 35°, where there were large blocks of granite deposited for miles beyond the opening of the valley.

Prof. Silliman described the peculiar character of the outcrops of the veins in the regions of the El Dorado Cañon. He found that nearly all vestiges of the sulphurets were removed from the outcrops, while they abounded below. The outcrops gave little indication of the metal-bearing character of the veins. He had observed as he believed, at least three distinct periods of volcanic activity in that region of the Colorado and Mohave, two of which periods were subaqueous, and the last sub-aerial. The lava-streams generally appeared to have been poured out after the face of the country had already assumed its present form. The volcanic outflows though extensive had not materially modified the topography of the country.

Mr. Ehrenberg stated that the copper ores in the vicinity of La Paz, and Mineral City, Arizona, were generally argentiferous, sometimes giving results by assay as high as $200 per ton. The ores beyond that district did not appear to contain much. The quicksilver ore at the Eugenie vein contained both silver and copper.

Doctor Behr presented the following paper:

## Notes on Californian Satyrides.

BY HERMAN BEHR, M. D.

### CHIONOBAS NEVADENSIS. Boisduval, *in litteris.*

A few specimens of this new and as yet undescribed *Chionobas*, were caught by Mr. Lorquin, the discoverer of the species, and named by Dr. Boisduval. Not possessing a single specimen of this rare species, I am not able to give a diagnosis, and have only an indistinct recollection, that the species bore most resemblance to the *Gerontogeic*, Ch. Tarpeja, a Siberian species that has also been found on the summit of the Appenines, in Italy, but that in size it is superior to any *Chionobas* known to me.

### SATYRUS STHENELE Boisd.

Is rather common near San Francisco, where it is found in June. Only one generation annually.

### SATYRUS SYLVESTRIS Edwards.

Edwards' description shows very clearly the marks by which *S. Sylvestris* can be recognized from *S. Sthenele.* This species is found on grassy hills thinly covered with live-oak, where its habits show a very marked difference from those of its relations, by preferring the underside of oak branches to any other seat, while *Sthenele* and *Boopis* almost exclusively settle on the ground.

### SATYRUS BOOPIS Behr.

Sthenele similis at limbus non tesselatus, sed linea transversa distincte partitus et fœminæ ocelli alarum superiorum in fascia dilutiori positi. Alae subtusdimidiatæ pars radicalis brunnea, marginalis grisea, marginem versus brunnescens. Utraque marmorata, halone ocellorum in alis anticis solo excepto dilutiori et concolori.

This *Satyrus* is the biggest of our Californian species, the male being nearly double the size of the female of *S. Sylvestris.* I find this *Satyrus* in July in Contra Costa, on the hills as well as on the plains. In regard to the diagnosis of these three closely allied species, I would mention, that the presence or absence of one or two more or less distinct eye-marks, on the upper or under side near the anal angle of the hind wings, is of no diagnostic importance.

### S. ARIANE Boisd.

I confess I can not find any constant mark of difference between this species and *S. Alope*, *Nephele*, and *Pegala*, however different at first glance their forms may appear. I am very much inclined to consider them local aberrations of one far spread species, that gradually slopes from *S. Pegala* Fabr., through *S. Ariane* Boisd. to *S. Nephele* and *S. Alope* Fabr., in a similar way as the Gerontogeic *P. Egeria* L. looks very different from its African form *P. Xiphia* Fabr., with which, nevertheless, it is insensibly united by its intermediate form *P. Meone.*

All my Californian specimens agree perfectly with Dr. Boisduval's diagnosis of *S. Ariane*; with the exception of one that approaches to *S. Pegala*, by its having only one eye-mark on the upper side of the anterior wings, but differs by the entire absence of the wide rusty band on the same. The specimen was among several undoubted *S. Ariane*, caught near Mono Lake, by Prof. Brewer, of the State Geological Survey. Besides the above mentioned locality, I received specimens from San Diego and Santa Cruz. Near San Francisco the species is wanting.

As to *S. Sthenele* and *S. Sylvestris*, I entertain no doubts regarding their rights as distinct species, but *S. Boopis* being only distinguished by the absence of the series of eyes on the under side of the hind wings from *S. Nephele*, may, perhaps, prove a local variety or aberration of that most polymorphous and far spread species *S. Alope.* In the mean time, until the connecting forms are found, I consider it to be specifically distinct.

### COENONYMPHA Hubner.

### *C. Galactina.* Boisd.

I consider this species as identical with *C. Californica.* Dbld. At least I find in a long series of specimens, no point where *Californica* ends and *Galactina* begins. *C. Galactina*, according to Boisduval, exists also in Kamtschatka. In California it is one of the commonest species of Diurnals, and is found in the most different localities, in several generations throughout the year. There exists a second *Cœnonympha* in some sequestered valleys of the Northern Sierra, that approaches in its coloration, the European *C. Pamphilas.* I have only seen one pair of this species, and not possessing it, I can not give a diagnosis. It may be that it is identical with *C. Inornata*, Edw., or *C. Ochracea*, Edw., or some other Northern species.

Extratropical America is not rich in *Satyrides*, if compared to the same latitudes in Europe or Asia, and California is especially poor.

| Europe | California. |
|---|---|
| *Arge*, | ——— |
| *Erebia*, | ——— |
| *Chionobas*, | *Chionabas*, |
| *Satyrus*, | *Satyrus*, |
| *Pararga*, | ——— |
| *Epinephele*, | ——— |
| *Cœnonympha*, | *Cœnonympha*. |

There are seven European genera, each of them represented by a whole series of species connecting different types. In California there are only three of which none is known to contain more than four species.

The Atlantic States add some tropical genera to the three genera already obtained in California, viz.: *Neonympha* Hubner, *Hyhpthima* Hubner, *Debis* Dbld., and *Calisto* Hubner. The genus *Calisto* seems to be confined to subtropical North America; the genus *Neonympha* spreads in numerous species through the tropics of America, and trespasses only in a few species the *Cancer; Hyphthima* is found in many species in the tropics of the Old World, and it is a very curious circumstance, that one species of this essentially Gerontogeic genus should be found in the Southern States. But the two American species of the genus *Debis*, are even more interesting, for all other species of this genus, are confined to the Indian Archipelago.

The metamorphoses of the *Satyrides*, are only with difficulty to be investigated.

They feed, as far as they are known, on Monocotyledoneous plants, the extratropical ones, with one exception perhaps, exclusively on Graminaceous plants. The Caterpillars shun the sunlight and hide themselves in the grass. Some of them bury themselves in the daytime in the ground and feed only at night. The tropical species feeding on Scitaminaceous, Aroideous plants, palms, and arborescent grasses, sport the shady thickets of tropical forests, in whose twilight depths, most of the species are also found in their imago state. Other ones like some of the *Morphonides*, and even some *Nymphalides* of the tropics, spend their days hidden under the luxuriant foliage of primeval forests and begin their flight only after sunset.

In a most interesting treatise on the characteristics of the insect fauna of the "White Mountains," by Samuel H. Scudder, (Boston Journal, Vol. VII, Part IV), I find the description of the Caterpillar of *Chionobas Semidea*, Edw., with a notice that it was found on Lichen. This would prove a most remarkable exception, as all the other *Satyrides* feed on Monocotyledoneous plants. Nevertheless, larvæ of Artic types are generally polyphagous, and adapted to some degree, to accomodate themselves to circumstances, and so I would not entertain any doubts about the feeding plant of the *Chionobas*, if it were not for the circumstance that Mr. Scudder confesses that he did not succeed in bringing the Caterpillar, with Lichen, to perfection. Perhaps the Caterpillar fed on grass, or perhaps some *Carex*, and was only, by some accident, compelled to crawl to the lichen-covered stone, where that gentleman found it. I hope to hear very soon about this most interesting object, for I consider the discovery of the metamorphoses of one insect, a more valuable fact than the diagnoses of ten new species, of which we do not know more than the external appearance.

Prof. Wm. P. Blake presented the following papers :

## Note on a large lump of Gold found on the Middle fork of the American River.

BY PROF. WM. P. BLAKE.

In July last, a mass of gold nearly free from quartz, was taken out of a placer on the Middle Fork of the American River, about two miles above Michegan Bluffs. It weighed, as taken out, 187 ounces troy, and sold for $17 50 per ounce, netting the finder $3,272 50. In melting, a loss of six ounces was experienced. There was a further loss to the purchaser, from the poor quality of the gold, the assay return of which I have not yet been able to obtain. The ordinary gold of the claim is worth $17 50. It is a singular fact, often remarked by dealers, that the large lumps of gold are almost always poorer in quality than the smaller ordinary grains from the same placers.

## Note on the Fossil remains of the Horse and Elephant, mingled, at Mare Island, San Francisco Bay.

BY PROF. WM. P. BLAKE.

The entire lower jaw and teeth of a horse, the fragments of which I exhibit to the Academy, were taken by me from the face of the shore cliff of Mare Island, together with broken pieces of bones of other large quadrupeds. The teeth of an *Elephas* had been found in the same place, a few weeks before, by Mr. Brown, the Naval Engineer, by whom my attention was directed to the place. The fossils occur in a stiff sandy loam, which rests on the eroded surface of the Tertiary or Cretaceous beds below. Near the surface is a layer of oyster shells, apparently an upraised bed, most of the shells being entire. The fact that the Horse and Elephant roamed together over our hills and plains, at the dawn of, or before the human period, is certainly not without interest.

## Ammonites or Ceratites from Oregon Bar, Middle Fork of the American River.

BY PROF. WM. P. BLAKE.

The specimen which I exhibit to the Society this evening, is from the collection of J. J. Spear, of this city. It was kindly loaned to me by that gentleman for examination. Not wishing to risk the specimen, by sending it to a paleontologist at the East, I had it photographed, and sent a copy to F. B. Meek, Esq., of Washington. It is not possible to determine from the specimen, whether these fossils are new or not, or even, whether they are *Ammonites* or *Ceratites*. They appear to be not unlike the fossils described by Dr. Trask, under the name of *A. Chiceonsis*, Proc. Acad. Nat. Sci. Cal.; but it is not safe to identify them, without the septæ can be clearly made out.

There are several casts in an argillaceous, somewhat micaceous slate. This locality is about 15 miles from Coloma. It is not certain, whether the specimen was taken from the slates in place, or broken from a loose mass.

Mr. Moore presented the following paper:

## On Brushite, a new mineral occuring in Phosphatic Guano.

BY GIDEON E. MOORE, PH. B.

In the spring of the present year, I received through the kindness of Wm. E. Brown, Esq., of Mare Island, in this State, a specimen of a mineral discovered by him in a cargo of phosphatic guano, at Camden, N. J. The locality from which it was derived, is not known, and though letters of enquiry have been sent to the parties to whom the cargo was originally consigned, no reply has been received up to this date. The texture and appearance of the guano would, however, point to some one of the Carribbean Islands, and more particularly, to the Island of Sombrero, as its probable source. It is very probable that the mineral may be recognized among the crystallized products occurring in other guano deposits.

In the specimen in my possession, the mineral occurs filling seams in the guano, varying from ⅛ to ¼ of an inch in width. The matrix itself is of the variety known as rock guano. It possesses an oolitic structure and a brownish white color, interspersed with small spots of pure white.

The mineral is in the form of small but very perfect and brilliant crystals with a cleavage in the direction of their greatest length, nearly equal to that of selenite; the laminæ, being also slightly flexible, as in the case of the latter species. Hardness, 2.25 (Moh's scale). Specific gravity, 2.208, (mean of two determinations). Color, yellowish white. Transparent. Lustre, vitreous, splendent, inclining to pearly on the cleavage faces.

When heated in a closed tube before the blowpipe, it whitens and gives off water, at an incipient red heat. In the platina forceps, it fuses with intumescence, at about 2. of Von Kobbell's scale, tinging the flame with the peculiar green characteristic of phosphoric acid. The button formed by fusion, crystallizes on cooling, showing numerous brilliant facets. Readily soluble, even in coarse crystals, in dilute nitric and hydrochloric acids.

A qualitative analysis, revealed the presence of Lime, Phosphoric acid, and water, with barely discernable traces of Magnesia and Alumina.

The quantity of mineral at my disposal was very small, scarcely exceeding one gramme in weight. In each of the following analyses, the water was determined in 0.2 grammes, the remaining 0.3 grammes being employed in the determination of the Lime and Phosphoric acid. The results were as follows:

| | 1. | 2. |
|---|---|---|
| Lime | 32.65 | 32.73 |
| Phosphoric acid | 41.50 | 41.32 |
| Water | 26.33 | 26.40 |
| | 100.48 | 100.45 |

These figures agree exactly with the composition of the neutral tri-basic phosphate of lime (2 CaO., H O, P $O_5$ ), with the addition of four equivalents of water of crystallization, (2 CaO, H O, P $O_5 + 4$ aq.) viz.:

| | | | |
|---|---|---|---|
| 2 CaO | 56.26 | = | 32.59 |
| P $O_5$ | 71.36 | = | 41.34 |
| H O | 9.00 | = | 26.07 |
| 4 Aq | 36.00 | | |
| | 172.62 | | 100.00 |

In the polarizing microscope, the mineral shows a vivid succession of colors. A sample has been sent to Prof. J. D. Dana, who has kindly undertaken the study of its crystallographic characters, and I hope, in a short time, to be able to communicate the results of his investigations to the Academy.

It is with very great pleasure, that I dedicate this species to Prof. Geo. J. Brush, of Yale College, to whose unwearied zeal and efficient labors, American Mineralogy stands so deeply indebted.

---

## REGULAR MEETING, SEPT. 19th, 1864.

### President in the Chair.

Seven members present.

Prof. Rudolpho H. Philippi, of Santiago, was duly elected an honorary member, and Mr. W. B. Ewer, of this city, a resident member of the Academy.

Donations to the Cabinet: A box of shells, containing 120 species, from Panama, by the Smithsonian Institution. Another box, marked C. S. L., containing 86 species of shells.

Donations to the Library: Smithsonian Contribution to Knowledge, Vol 13. Nachrichten von der Georg-August-Universität of Göttingen, Nos. 1 and 2, 1863. Verhandlungen der R. R. Zoclogisch-botanischen Gesellschafft in Wien. Jahrgang 1863 Hefte I, II, III, IV von Bd. XIII. Verhandlungen des Natur'h Vereins der Preuss. Rheinlande und Westphalens 20str. Jahrgang, Bog. 1–10 und Bog. 11–43, 1863. Smithsonian Miscellaneous Collections, Vol 5, 1863. Glossaria Linguarum Brasiliensium, von Dr. C. F. Phil. von Martius, Erlangen 1863. Monographie der Oestriden von F. Brauer, 3 vol. Ofversicht of R. Vetenkaps-Academiens Förhandlingar. Stockholm, 1860, 1861, 1862. Sitzungsberichte der K. Baviaran Acad. der Wissenschaften zu München 1863, Hefte I, II, III, und doppelheft IV, 1863. Rede von J. Freiherrn von Liebig 1865. Proceedings of the Royal Horticult. Society, 1863. Hypsometrie von Mähren und östr. Schlesien, von Carl Koristka Brün, 1863. Abhandlungen der Math-phys. classe der K. Bayer. Acad. der Vissenschaften Abtheil. 111, Bd. 9, 1863. Von dem Rechts Zustande unter den Ureinwohnern Brasiliens von Dr. von Martius. Jahrbuch der Geol. Reichsanstalt, Bd. 13, Nm. 2, 3, 4, 1863. Eilfter Jahres-Bericht des Wiener Vereins, 1861. Zwölfter Jahres-Bericht des Wiener Vereins, 1862. Kongliga Svenska Vetenskaps Academiens Forhandlingar, Bd. 3, 1859, Bd. 3, 1860, Bd. 4, 1861. Nederlandsch. Meteorol. Yaarbock, 1862. Annals of the Lyceum of Nat. History of New York, Vol. 7, 1862, Vol. 8, part 1, 1863. Der Zoolog. Garten Frankfurt, Jahrg. 4, Nrs. 7, 8, 9, 10, 11, 12, Jahrg. 5, Nr. 1. Bericht über einige im Niederen Gesenke und im Hartzgebirge ausgeführte Höhenmessungen, Wien, 1861. Das Geograph. System der Winde von Dr. M. H. F. Prestel Emden, 1863. Mémoires de l'Acad. Imp. des Sciences de St. Pétersbourg, VII Série, Tome 4, No. 10 et 11, Tome 4, feuilles 26 à 36, Tome 5. feuilles 1 à 8.

Dr. Winslow, a former member of the Academy, was introduced by Mr. Boynton, and made some interesting remarks upon his travels in South America.

---

## REGULAR MEETING, OCT. 3d, 1864.

President in the Chair.

Eight members present.

Mr. Hinsmann and Baron Thurlow as visitors.

Donations to the Library: A supplement to the Terrestial air-breathing Mollusks of the U. S., by W. G. Binney.

Prof. Brewer gave an account of recent explorations in the Sierra Nevada, by the party connected with the State Geological Survey. The exploration extended from Kern River to the Yosemite Valley, and was peculiarly rich in scientific results. The crest of the chain is very high; along the whole of this distance, the high peaks, rising to above 13,000 feet, the culmination being between the sources of the Kern and Kings Rivers, where there are a number of peaks over 14,000 feet, and one about 15,000 feet in height. Along the whole of this, there are abundant traces of glaciers, some of the morains of which are truly gigantic, far surpassing anything else of the kind yet found in the State. The cañons of all of all the principal streams are very deep and abrupt.

The Big Trees or Sequoias, were found over a large area, extending perhaps 25 miles along the western slope, along the tributaries of the San Joaquin, Kings, Kaweah, Tule and Kern Rivers. The amount of snow in this part of the sierras, is apparently very much less than usually occurs.

Prof. Wm. P. Blake, read the following:

## Note on the discovery of Fossils in the Auriferous Slate formation of the Mariposa Estate, California, and the probable geological age.

BY PROF. WM. P. BLAKE.

During a recent visit to the Mariposa Estate, Mariposa County, my attention was called to some organic remains in the slates, near Bear Valley, by Miss Errington, a lady who takes an enthusiastic interest in the sciences of geology and mineralogy, and has for some time past, been seeking for fossils in the gold formation of that neighborhood. One of the specimens was the cast of a bivalve shell, and appeared to me to be a *Plagiostoma*. On further search, we found other specimens, some of which much resemble *Inoceramus*, to which I am inclined to refer them. Certain long tubular cavities in the slates, marked with heavy lines, and slightly converging, seemed to be casts of long, nearly cylindrical shells, possibly *Nerinæa*. These forms would indicate a Jurassic or Cretaceous age for the formation. I propose to submit these specimens to a competent Palæontologist, at the East, for examination, and to dedicate one of the species, if new, to Miss Errington.

### REGULAR MEETING, OCT. 17th, 1864.

President in the Chair.

Seven members present.

Donations to the Cabinet; A fossil tooth of Elephant, and several fossil teeth of Horse, from Wellington's Station, on the road from Carson Valley to Aurora, by Mr. Clayton. Specimens of silver ore from the Osceola Lode, Montgomery District, 60 miles S. E. of Aurora, and specimens of silver ore from Bear Mountain, Calaveras County, by Mr. Clayton.

Donations to the Library: Fragmenta Phytographiæ Australis, Vols. 1, 2, 3, and part of Vol. 4. Transactions of the Philosophical Society of Victoria, Vols 1 to 5. The plants indigenous to the Colony of Victoria, Vol. 1. All donated by Dr. Ferdinand Mueller, Director of the Botanical Garden at Melbourne.

Mr. Clayton made the following remarks in regard to his donations above mentioned:

The teeth were found near Walkers River, about one mile below the residence of Mr. G. E. Wellington, on the Carson River and Aurora Road. This river cuts through a high range of hills immediately west of Wellington's, and enters a large basin or valley, which is some thirty miles long, from north to south, by twenty miles wide, from west to east. After passing through this valley to the eastward, the river enters another cañon of considerable extent, and then empties into Walkers Lake, in the southwest portion of the great basin.

The banks of the river are formed of gravel, sand, and clay cement, containing soda and calcareous matter, which forms a white crust on the surface of the stones and pebbles. The cement bluffs along the river, are from 6 or 8 to 20 feet high, and are cut out by changes in the channel during high water.

In one of these recent cuttings, the large tooth was found, with part of the upper jaw and other portions of the skeleton. There has been no excavation made, as yet, to uncover other portions of the skeleton, but Mr. Wellington has promised to have it done, and to secure as much of the skeleton as possible, for the Society's collections.

The small teeth were found about five feet below the surface in the solid cement, by some parties that were digging a grave. Quite a number of teeth were found, but with the exception of the two just presented to the Society, they were not preserved.

## REGULAR MEETING, NOV. 21st, 1864.

President in the Chair.

Seven members present.

Rev. Horatio Stebbins was duly elected a resident member, Mr. Edward Bosqui a life member, and Mr. G. E. Wellington, of Nevada, a corresponding member, of the Academy.

Donations to the Cabinet: Specimens of Corals from the Hiton group of Islands, also a photograph of a Fungus [Agaricus], from the Society Islands, by Mr. Hubbard, on behalf of Mr. Andrew Garrett. Two specimens of Inoceramus, from Seattle, Puget Sound, by Mr. Hubbard.

Mr. Gabb presented the following papers:

## Notes on some Fossils from the Gold Bearing Slates of Mariposa, with description of some new species.

BY WM. M. GABB.

Through the kindness of Miss Errington, of Bear Valley, Mariposa County, I have had the opportunity of examining a series of fossils, discovered by that lady on the Mariposa Estate. The shells appear to be of Jurassic age. The genera so far recognized, are Belemnites, Nucula or Leda, Lima, Pecten, and Pholadomya. The following are sufficiently perfect for description. Fuller descriptions and figures will be published hereafter in the Geological Report of the State.

### Lima, Brug.

*L. Erringtoni* G. Shell very oblique, sides subparallel; beaks small; anterior end prominently rounded, sloping with a broad curve below to the base; posterior side nearly straight, continuing upwards in a long narrow ear; anterior ear obsolete (?).

Surface marked by strong concentric undulations, crossed on the upper and posterior portions by fine radiating lines.

Length, 2.25 inches; width, 1. inch.

The specimens are all very much compressed, and may be somewhat distorted in form, though the outlines are very nearly uniform in all of the specimens.

### Pholadomya, Sow.

*P. orbiculata* G. Compressed, sub-circular; beaks rather prominent, nearly central; anterior end and base regularly rounded; posterior end slightly produced, more prominent below than above. Surface ornamented by concentric ribs, irregular in size, crossed by undulating, radiating lines on the anterior half of the shell. These lines become gradually obsolete and disappear on or about the middle of all of the specimens, although more perfect examples might show them continuing further.

Height, from a slightly distorted specimen, 1.1 inch; width, 1.3 inch.

Like the preceding species, all of the specimens have suffered considerably by compression; and had we perfect specimens, the shell would be found to be quite convex.

### Belemnites.

*B. Pacificus* G. Long, slender, tapering very gradually and with a slight convexity to the tip. Section, sub-elliptical; alveolus deep and narrow.

A specimen 3 inches long, measures .35 in. in diameter in the middle. One cast has been found with a diameter of .9 inch at the broadest part.

I first discovered this species, as imperfect casts, in the slates near Spanish Flat, El Dorado County. Since then, numerous fragments and casts have been found at Mariposa, by Mr. C. R. King and Miss Errington.

## Communication on the San Luis Obispo Quicksilver Fossils.

BY WM. M. GABB.

Mr. Attwood has recently presented to the collection of the State Geological Survey, a series of Fossils collected by himself, in the formation in which the San Luis Obispo cinnabar deposits occur.

Through the kindness of Prof. B. Silliman, Jr. I have had the opportunity of examining another small collection, made by that gentleman, at the same locality. I consider the result of sufficient interest to warrant a special communication on the subject.

The Fossils, though few in number of species, point unequivocally to the Miocene formation, the species being among the most familiar forms in the middle deposit of that formation in California.

They were: Dosinia ponderosa, Saxidomus aratus, Conus ravus=*C. Californicus* Reeve, Turritella Ocoyana Con., Natica, probably N. Recluziana, Pecten Pabloensis Con., Pallium Estrellanum Con., Carcharodon rectus Agas. a Balanus and one or two small shells too imperfect for determination.

---

Mr. Moore presented on behalf of Prof. Dana, the following paper:

## On the Crystallization of Brushite.

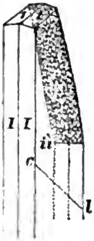
BY JAMES D. DANA, L. L. D., PROFESSOR OF MINERALOGY IN YALE COLLEGE.

The specimens of the mineral Brushite, which I have had under crystallographic examination, were received from Mr. G. E. Moore, the discoverer of the species.

The crystals are slender prisms, not over a third of an inch in length. A common form (containing all the observed planes), is shown in the annexed figure. The prisms are monoclinic, and are often flattened, parallel to the clinodiagonal, as here represented.

Cleavage is perfect, parallel to the clinodiagonal section, or the plane iì; also distinct parallel to the line *cl*, as apparent often in the cross fractures of the crystals, and by occasional striæ. This plane of cleavage may be taken as the basal plane *O*.

The planes *I* and 1 are brilliant, especially the former. The oblique plane situated on the back side in the figure, and which may be called *r*, is quite rough, owing to the oscillatory combination between two hemi-octahedral planes. In many of the crystals, only the right one of the two planes *I* is present, and also only the left one of the two planes 1. The prisms frequently terminate above in an irregular edge, made by the meeting of the one, or two, planes *I*, and the rough plane *r*, and this edge is sometimes cut off, more or less deeply, by a single oblique plane, which is one of the planes 1.



According to measurements with the reflective goniometer;

*I* : *I* = 142° 26′ 1 : iì = 101° 40′
*I* : iì = 108° 47′ 1 : 1 = 156° 20′ (approximately.)

The inclination of the 1 on 1 could not be accurately measured, on account of the minuteness of the planes in the crystals, in which both planes occur, and the want of perfection in the reflection. The angle obtained for 1 : iì would give, for 1 : 1, 156° 40′.

By measurement with a goniometer attached to a compound microscope, the plane angle between the lines of cross cleavage, or *cl*, and the edge *I* : *I* (which equals the inclination of *O* on the orthodiagonal section, or a plane iī) was found to be 117 – 117½°; and that between edge $I : I$ and edge 1 : 1 (which equals *ii* on 1*i*, both unobserved planes) 95°–95½°: whence $O$ : 1*i* would equal approximately 147° 30′. The inclination of the rough plane *r* on the edge 1 : 1 is about 110°, but varies much.

The results of calculation, taking as data the above mentioned angles $I : I$ and 1 : *ii*, along with the inclination of $O$ to *ii* = 117° 15′, and that of the edge 1 : 1 (or 1*i*) to *ii* = 95° 15′ are as follows:

$$C\ (= O : ii) = 117°\ 15' \text{ and } 62°\ 45'$$

$$a \text{ (vert. axis)} : O \text{ (clinodiag.)} : c = 0.5396 : 1 : 2.614$$

$$1 : 1 = 156°\ 46' \qquad -1 : -1 \text{ (unobserved planes)} = 164°\ 22'$$

The species is related in form to Vivianite, in which

$$a : b : 2c = 1.0792 : 1 : 2.614.$$

The crystals of the two species are also alike in the perfect and pearly clinodiagonal cleavage.

---

# On new Californian Marine Shells. No. II.

BY PHILIP P. CARPENTER, PH. D., OF WARRINGTON, ENGLAND.

## Genus COLLONIA, *Gray*, 1852.

This genus was established (in English) by Dr. Gray, for Turbinate shells having an "operculum circular, with many gradually enlarged whirls, with a convex external rib and central pit." The type (still appearing as such in the B M. Col.) is a smooth fossil from Grignon, = Delphinula marginata, Lam., with a keeled and crenated umbilicus, like Phillippia. Another (African) shell is joined to the diagnosis, with the following brief description: "C. striata, *Gray*. Shell red, white marbled, striated." It is quoted by Phillippi, Handb. Conch. p. 206, who assigns as a type T. sanguineus, *Linn.* For this species and its congeners, we now propose a subgenus LEPTONYX, as they do not agree with the type. The genus was reconstituted by Messrs. Adams, Gen. i. 396 for shells with "imperforate axis and contracted aperture:" the description of the operculum being copied from Gray. The type is now "C. marginata, *Nutt.*" pl. 44, f. 2, the operculum of which is figured as with *few* whirls. The same description and figure are given in Chenu, Manuel i. 348, f. 2560. The error seems to have arisen thus. Mr. H. Adams (who acted for the 'firm' during his brother's long absence in Japan,) probably took Gray's C. marginata to be the 'Turbo marginatus, Nutt.' of Reeve, and from this species as type, described the genus to be imperforate, etc. Unfortunately, Dr. Gray did not observe the error, which had arisen from confounding two different shells called marginatus; and in his guide to Mollusca (in loco) he adop's the description of Messrs. Adams; so that Collonia, *Gray*, (hodie) = Collonia, *Add.*, but not Collonia, *Gray*, (olim). Of the species arranged by Mr. H. Adams under Collonia, some may belong to the original genus; some are included under Cynisca, *A. Ad.*; and one (Turbo phasianella, *C. B. Ad.*) appears to be Eucosmia. They appear in the Br. Mus. Col. distributed between Gibbula and Photinula. The true Turbo marginatus of Nutt. is the ordinary black Californian Chlorostoma, like mœstus, and well named from its frilled margin near the suture. But the label having become affixed to the T. marginatus *Rve.* (which must stand as Reeve's species and not Nuttall's) the Californian shell was left without name, and was described by Mr. A. Adams as Chl. funebrale, under which name it must stand as Nuttal's prior name was (unfortunately) in MS. only. The name Collonia marginata must stand for the original fossil of Lamarck. It is probable that Reeve's shell belongs to another group; else it must, according to the usual custom of honoring error, be called C. Reevei. For the Californian species, which are imperforate and have a thin, smooth operculum, Mr. A. Adams and I propose to form a subgenus *Leptonyx*; a diagnosis of which will appear in the next paper. after the foreign species have been examined. The following are the Californian forms.

*Leptonyx sanguineus*, Linn.

H. t. parvâ, solidâ, rubrâ, anfr. V. subtumentibus, suturis plus minusve impressis; costulis spiralibus plus minusve rotundatis cinctâ, quarum iv.–viii. in spirâ monstrantur; aperturâ subcirculari; columellâ t. adolescente foveâ basali et dente ut in 'Modulo' munitâ; adultâ, callositate tenui labiali, foveam tegente, obscure bidentatâ; labio tenui, continuo; umbilico nullo.

*Hab.* Mediterranean, *Phillippi*, *Hanley*. Japan, *A. Adams*. Monterey, *Jewett*, *Taylor*, *Cooper*. Neeah Bay, W. T., *Swan*.

= Turbo sanguineus, Ln. Syst. Nat. Ed. 12, p. 1235:—Phil. Moll. Sic. in loco: Hanl. Ips. Lin. Conch. in loco.

= T. Belliæi, Michaud in Mus. Paris: teste Hanl.

Non "Turbo sanguineus, Linn." Rve. Conch. Ic. sp. 55: = T. coccineus, *Desh.* = Globulus roseus, Chem. teste Rve. Nec (Gibbula) sanguinea, *Risso*.

Reeve says of his shell. "I am not quite sure that this is the T. sanguineus of Linnæus, but *have every reason* to believe it is." That is, every reason except the one only convincing proof, which was so easy to a London naturalist, an inspection of the original type in the Linnæan Collection. A mere glance at this would have exposed his error. Reeve's shell is whitish, with blood-red spots, and is probably a S. African species. Whether Linnæus described from Mediterranean or Japanese specimens, cannot be told from his rubbed shells; nor as yet have sufficiently perfect specimens been compared from the two oceans; but no character has been observed by which they can be separated. The great author obtained his Algerine and his Philippine shells from the Swedish consuls; and Japanese species may have been mixed with the latter. It is very rare in the Mediterranean; common in Japan; common also at Vancouver; but rare further south. It is, we believe, the only Californian shell described by the father of modern Natural History. The specimens vary very greatly in strength of sculpture. There is also a purple variety.

*Leptonyx (sanguineus*, var.*) purpureum*.

H. t. 'H. sanguineo' simili, sed purpureo fuscâ; lirulis spiralibus crebioribus, interstitiis parvis, labio obsoleto.

*Hab.* Sta. Cruz, *Rowell*. Monterey, *Cooper*. Neah Bay, *Swan*.

### *Leptonyx baeula*, Carp.

L. t. "L. sanguineo, jun." simili; sed rufocinereâ, sculpturâ obsoletâ; anfr. iv. planatis, suturis vix distinctis, marginibus spiræ valde excurvatis; lirulis obsoletis latioribus, et circa basim striis crebris, vix sculptâ; apertura rotundatâ, declivi; columellâ vix callosâ.

Long. 0.08, long. spir. 0.06; lat. 0.14.

*Hab.* Catalina Is., dead on beach; *Cooper*, No. 1056.

This unpretending little shell resembles on the back one of the small Helicinæ. It differs from L. sanguineus in its small size, ashy color, flattened sutures, and nearly obsolete sculpture. A groove in the somewhat callous columella, continued slightly round the labrum, seems intended for the broad-margined operculum of the genus.

## Annual Meeting, Jan. 9th, 1865.

President, Col. Ransom, in the chair.

Twelve members present.

Theodore Bloomer was elected a resident member.

The Annual reports of the officers were received, as follows:

The report of the Treasurer was referred to the Finance Committee. The reports of the Curators were received and accepted.

The Committee on nominations reported the following list of officers for the year 1865, which was duly elected.

PRESIDENT.

Col. L. RANSOM.

VICE-PRESIDENTS.

J. N. ECKEL, M. D., J. B. TRASK, M. D.

CORRESPONDING SECRETARY.

W. O. AYRES, M. D.

RECORDING SECRETARY.

T. H. BLOOMER.

| LIBRARIAN. | TREASURER. |
|---|---|
| Prof. J. D. WHITNEY. | SAMUEL HUBBARD. |

CURATORS.

| | |
|---|---|
| *Mineralogy* | G. E. MOORE |
| *Palæontology* | WM. M. GABB |
| *Botany* | H. N. BOLANDER |
| *Zoology* | E. F. LORQUIN |
| *Conchology* | R. E. C. STEARNS |
| *Entomology* | DR. H. BEHR |

Donations to the Cabinet were received as follows: from Dr. C. T. Jackson, specimen of Corundum and Margarite.

Mr. Gabb presented, on behalf of the authors, the following papers:

## On Californian Lepidoptera.

BY HERMAN BEHR, M. D.

### ERYCINIDÆ.

### NEMEOBIUS Boisd.

*N. Dumeti* Behr.

Alæ supra nigræ, fasciis duabus albis signatæ, altera medias per alas transgrediente, altera per spatium inter fasciam mediam et marginem, utraque hinc interrupta vel macalari. Alæ anteriores a radice ad fasciam mediam fulvæ, maculis quatuor quadrangularibus nigro marginatis signatæ.

Alæ subtus grisescentes, marginem versus dilutiores. Anteriores a radice ad fasciam mediam fulvæ, ceterum ut supra signatæ, posteriores fascias demonstrant ut supra, sed confluentes, et hinc coufusas.

This species is found in some parts of California, and always in localities that are covered by the peculiar vegetation called Chaparral.

• *N Virgulti*, Behr.

Alæ supra nigræ, fulvo mixtæ, fasciis duabus signatæ, altera medias per alas transgrediente, colore fulvo fere ubique obducta, altera per spatium inter fasciam mediam et marginem ad punctorum alborum seriem reducta.

Alæ anteriores usque ad marginem fere fulvæ, fascia intermedia maculisque disci albis, nigro marginatis. Margo alarum anteriorum, alæque posteriores totæ grisescentes punctis maculisque albis, nigro marginatis variegatæ.

This species was found near Los Angeles, by Mr. Lorquin, who gave me several specimens. In the male the black color is more predominating, in the female the fulvous coloration.

For the sake of completing this series of diagnoses, I give here the description of a third species, that I received, by the kindness of Dr. Dinklage, from the Sierra Madre, in the neighborhood of Mazatlan. I think it indispensable to give the marks of this closely allied Nemeobius, as I am of the opinion that thus errors will most effectually be avoided.

*N. Mejicanus*, Behr.

Alæ supra fulvæ, marginem versus brunneæ, fasciis maculisque ordinariis omnibus albis nigro marginatis instructæ. Subtus alæ anteriores fulvæ, apice et margine grisescentes, fasciis et maculis ut supra. Alæ posteriores grisescentes, maculis albis et nigro marginatis et confluentibus cum colore universali irregulariter variegatæ.

The most positive and striking points of difference would be thus:

1. *N. Dumeti.* Fore wings alone show a fulvous coloration on the upperside. Bands and spots perfectly white.

2. *N. Mejicanus.* All wings are occupied with it, till beyond the second band, where the brownish coloration of the margin begins. Bands and spots perfectly white.

3. *N. Virgulti.* Extension of the fulvous as in the preceding, but all the space more or less occupied by black. Middle band nearly altogether fulvous, other bands and spots white.

As much as we know, the type of this genus *N. Lucina* L, was the only species known heretofore, and it is another proof of the various repetition of types on occidental coasts, that we have to add three Pacific representatives of a genus first discerned in a single European species.

The group of the *Erycinides* belongs essentially to tropical America. The beforementioned *Nemeobius Lucina* is the only European representative of this numerous and polymorphous group. Besides this, there exist some few Asiatic members of this family, very aberrant in their type, scarcely known and insufficiently examined, so that possibly they may belong somewhere else. In America the tropical genera *Nymphidia* and *Lemonias*, extend beyond the Cancer on the Atlantic side; but on the Pacific side reappears the European genus *Nemeobius*, extending into the Tropics, and seems to find here its very centre.

## Description of New Species of Land Shells.

BY W. NEWCOMB, M.D.

### *Helix Blakeana*, Newc.

Hel. testa unicolor flavido-alba, rotundato, semi-globosa, nitida, translucida; umbilico amplo, profundo et parum obtecto; apice obtuso; anfractibus sex, convexis, tribus superioribus sub-planis, reliquiis rapide accrescentibus, ultimo inflato; sutura bene impressa; apertura rotundato-lunare; peristomate tenue, ex panso-reflexo cum columellâ sub-late dilatatâ, non adnatâ.

Alt. ·7 pol., Diam maj. 1·1 pol., min. 1· pol.

Hab. Insula Niphon—Japan, (teste Blake).

Shell uniformly yellowish white, rounded, half globular, shining, translucent, umbilicus large, deep and slightly covered; apex obtuse; whorls six, convex, the three first nearly on the same plane, the balance rapidly increasing, the last swollen; suture well marked; aperture roundly lunar; lip thin, flatly reflected, at the columella broadly dilated but not adherent.

NOTE.—In general form and color, this species makes a nearer approach to *H. candida*, Moricand, than to any species with which I am acquainted. It varies in the less elevation, in the form of the spire, and in some other respects. Professor Blake had remarkable facilities for collecting in Japan, but unfortunately the mice proved so destructive to his terrestrial shells, as to leave him but few specimens as the result of his labor.

### *Helix declivis*, Newc.

Hel. testa perspectivo-umbilicata, lenticulare, oblique striata, tenue, pallide-cornea; anfr. IV, planulatis, ultimo declivi, in medio sub-carinato; sutura sub-canuliculata; peris. fragile, simplici: apertura obliquo-sub-rotundata.

Alt. ·1 pol., Diam. maj. ·3 pol., min. ·2 pol.

Hab. Insula Niphon, (Japan).

Shell perspectively umbilicate, lenticular, obliquely striate, thin, pale horn color; whorls four, planulate, the last shelving down to the centre, which is obscurely keeled; suture channelled; lip fragile, simple; aperture oblique, almost round.

REMARKS.—Bears some resemblance to *H. ruderata*, Stud., a species common in Europe, from which it may readily be distinguished by comparison.

NOTE.—The Japanese species herein described, were collected by Professor Blake, in the interior of the Island of Niphon, out of the range permitted to foreign travel.

The Professor, who was employed by the Japanese Government as a special geologist, had the privilege of penetrating districts not before visited by any scientific or mercantile foreigner. The following species of Helices were also among those collected:

*Helix peliomphala*, Pfr., (Mon. Hel. viv. Vol. 4, Sp. 1764).
*H. quesita*, Deshayes, (Reeve's Mon. fig. 1355).
*H. Perryi*, Jay, (Perry's Exped. Vol. 2, page 294, Plate 5, fig. 7, 8, 9).
*H. Simoda*, Jay, ( do. fig. 1 to 6).

Some doubt may exist as to the *H. quesita* being identical with *H. Perryi*. But one specimen was preserved, and this fully agrees with the description and figure of the first named, but the locality for the species is given as the "*Moluccas*."

It also agrees (except in colour) with Dr. Jay's description, and also in the very poor figures illustrating the species of *H. Perryi*. The only question in my mind is one regarding locality.

### *Helix Cronkhitei*, Newc.

Hel. testa aperta umbilicata, depressa, luteo-cornea sub-lente regulariter costulato-striata; spira depressa-convexa; sutura excavata; anfractibus quatuor, sub-cylindraceis; umbilica ampla, sub-perspectiva; apertura rotundata; peristomate simplici, acuto, marginibus conniventibus.

Alt. ·15 pol., Diam. maj. ·2 pol., min. ·15 pol.

Hab. Klamath Valley, Oregon, (Gabb).

Shell openly umbilicate, depressed, yellowish horn colour, under the glass regularly rib striated; spire depressed, a little convex; suture wide and deep; whorls four, rather cylindrical; umbilicus large, indistinctly perspective; aperture rounded; lip simple, acute, margins approximating.

REMARKS.—Mr. Bland may *possibly* refer to this species as *H. striatella*, Anthony, which was obtained by Dr. Cooper on the Pacific side of the Rocky Mountains. (See addenda to "Remarks on Classification, etc., 1863). This species is certainly distinct from *striatella*, by its smaller size, rib-like costa, and almost channelled suture.

A few specimens were obtained by Mr. Gabb, of the State Geological Survey, in Klamath Valley, which were collected jointly by himself and Dr. Cronkhite, U. S. Army.

### *Helix Rowelli*, Newc.

Hel. testa aperta-umbilicata, orbiculato depressa, alba, opaca, polita, minutissimo-oblique striata; anfractibus quatuor vel quinque convexis, ultimo magno' antice deflexo; spira vix elevata, apice sub-mamillato; sutura modice impressa; apertura fere circulari; labro tenui, reflexiusculo, marginibus continuis ad juncturam; anfr. ultimo adnato.

Alt. ·4 pol., Diam. maj. ·6 pol., min. ·5 pol.

Hab. Arizona, (dicto Frick).

Shell with open umbilicus, orbicular, depressed, opaque white, polished, very finely obliquely striate; whorls four and a half, convex, the last large, anteriorly descending; spire but little elevated, at the apex projecting like a nipple; suture moderately marked; aperture truly circular; lip thin, slightly reflected, margins continued, adhering to the last whirl.

REMARKS.—This is another of the Cyclostomoid species of which *H. Carpenteri*, Newc., *H. Cærulano*, Muhl., and *H. Angasiana*, Pfr. form striking examples. Our species approaches nearer in lightness of substance and in its depressed form to Muhlfeldt's shell, than to either the others.

I take pleasure in dedicating this species to the Rev. M. Rowell, of San Francisco.

### *Succinea Japonica*, Newc.

S. testa ovato-conica, flavido-cornea, lævissima, striatula, nitida, pellucida; anfractibus III, nucleo sane mamillato, ultimo 4·5 longitudinis fere æquante; apertura elongato-ovali; peristomate simplici; columellâ regulariter arcuata ad juncturam labro superiorem acuto-angulata.

Long. ·55, Diam. ·35, Apert. long. ·4, lata. ·233 pol.

Hab. Japan, (Prof. Blake).

Shell ovately-conic, yellowish horn color, very smooth, finely striate, shining, pellucid; whirls three, nucleus truly mamillate, the last four-fifths of the entire length; aperture elongately ovate; lip simple; columella regularly arched; at the juncture of the lip above, acutely angular.

### *Remarks on Helix Hillebrandi*, Newc.

At the time of publication of this species, but a single recent specimen had been obtained, and that was freed from the epidermis. The statement that the shell was *hirsute*, was founded upon the cicatrices observed upon the surface, Mr. Gabb, who has recently returned from a trip to Mariposa, was successful in finding a few specimens, by which the diagnosis may be enlarged, and conjecture resolved into certainty. The whole surface is covered with an epidermis, of a yellowish brown colour, thickly studded with slightly curved rigid hairs about one-twentieth of an inch in length. The animal is of a reddish brown color, with the tentacles of a smoky hue; tentacular sheaths darker than the body, which is small, slender, finely granulated and unusually long and tapering behind.

The shell bears the same relations to *H. Dupetit Thouarsi*, Deshayes, that *Helix infumata*, Gould, bear to *H. fidelis*, Gray. In the description of *infumata*, an important omission occurs, owing doubtless to the imperfect condition of the type specimen. In good specimens, all of the last whirl, except a circle round the umbilicus, is covered with *very short* and thickly studded soft hairs, feeling harsh when dry, but velvety to the touch when moistened.

### *Achatinella Alexandri*, Newc.

Ach. testa perforata, sinistrorsa, elongato sub-cylindracea, nitida, rufo-brunnea, nigro-elongato-venulato-inosculante picta; anfr. VI convexis, regulariter accrescentibus; apice obtusiusculo; sutura modice impressa, non emarginata; apertura parva, sub-ovata; labro acuto; columella alba breve, sub-recta, truncata, infra in plicam tortam terminante.

Long. ·6 pol., Diam. ·25 pol., Aper. long. ·2 pol. ·1 lata.

Hab. Insula Sandwich, (Maui).

Shell perforated, left handed, elongately sub-cylindrical, shining, reddish-brown, with painting of elongate, inosculating black veins; whirls six convex, regularly (but slowly) increasing; apex a little obtuse; suture moderately impressed, not emarginate; aperture small, sub-ovate; lip acute; columella white, short, almost straight, truncate, terminating by a twisted plait passing within.

This species is more cylindrical than any of its congeners, resembling most *A. Renyi*, Newc., which is longer, not umbilicate, more pointed at the apex, with a twisted, not truncate columella.

From *venusta and citrina*, Mighels, it varies both in form and color. With some varieties of *picta* it claims analogy only in the general plan of painting Its striking characteristics are its blunt apex, slightly rounded whorls, small aperture, short and white columella, umbilicus, and general plan of coloring.

A few specimens were collected at an elevation of 7,500 feet, on West Maui, by the Rev. M. Alexander, to whom the species is dedicated.

## Description of New Species of Marine Shells from the Coast of California.

BY WM. M. GABB.

The following are a few of the shells collected by Dr. J. G. Cooper, of the State Geological Survey, during his explorations along the coast of this State.

The specimens are preserved in the collection of the Survey; most of them appear to be very rare in a living state, though I have encountered several of them in the later Tertiary deposits, especially in the Post Pliocene.

### MUREX, Linn.

#### *S. G. Muricidea*, Swains.

#### M. BARBARENSIS, G.

M. t. unicolor, fusca; varicibus V-IX, haud magnis ad angulum auctis; varix ultima prælata; anfractu primo lævi, anfractibus V supra recte truncatis, infra parum convexis; tota superficie liris spiralibus et squamosis induta; apertura subelliptica, intus lactea; labio incrassato, polito; labro extante, tuberculis intus ornata; canali interdum recto, interdum recurvato.

Long. ·77, lat ·46, long. aper. ·2, long. canal ·24.

Shell small, brown; whorl six, the first smooth, the remainder angulated, horizontally or a little concavely truncated above and very slightly convex below the angle; varices variable, from five to nine, usually about six or seven to a whorl, angular but not very prominent, except on the angle, where they are sometimes prolonged into long recurved processes, in other cases only making a prominent angular tubercle; the whole surface is covered with strong revolving ribs, crossed by fine squamose plates; aperture sub-elliptical, lips prominent, white within, the outer lip with five or six tubercles internally, last varix forming a broad lateral expansion to the lip; canal closed, straight, or more usually a little recurved.

Hab. Catalina Island, 40 fms., and Santa Barbara Channel, 20-30 fms. Dr. Cooper.

*Nos.* 515 *b*, c and d, Mollusca, Survey Cabinet.

### PLEUROTOMA, Lam. 1799.

#### *Turris*, Bolt. 1798, not *Turris*, Hump, 1797.

#### S. Gen. *Surcula*, H. & A. Ad.

#### P. PERVERSA, G.

P. t. sinistra, unicolor, rufo-brunnea; sub-fusiformis; anfractibus XI vel XII lævibus rotundato-compressis; apertura angusta, labio tenui, acuto.

Long. 1·2, lat. ·35, long. aper. ·45.

Shell sinistral, elongate sub-fusiform, apex acute, sometimes slightly bent, nuclear whorls two, very convex, loosely twisted and white; whorls, eleven or twelve, slightly convex; color a light reddish brown, somewhat lighter on the middle of the whorl; aperture narrow, canal short, inner lip moderately encrusted with a white callus, brown on the outer margin; columella twisted; outer lip acute, sinus rounded, shallow, broad and adjoining the suture.

Hab. Catalina Island, 60 fms., Dr. Cooper. Also fossil, not rare, in the P. Pliocene at San Pedro. One specimen from that locality is two inches long.

No. 1020, Mollusca, Survey Cabinet.

#### P. (S.) CARPENTERIANA, G.

P. t. fusiformis; anfractibus VIII, prope suturam concavis; tota superficie confertim et spiralitur costulata; colore aurantiaco, lineis rufo-brunneis interruptis induta; apertura angusta; sinu postico lato, haud profundo.

Long. 2·, lat. ·7, long. aper. 1·1.

Fusiform, spire high, acute, whorls eight, slightly concave near the suture, convex below. Surface marked by numerous rounded revolving ribs, sometimes alternating in size, especially on the lower part of the body whorl. Color, orange with broken revolving bands of a bright reddish brown; these lines or bands usually occupy the larger ribs, and are more distant on the middle of the whorl and more closely placed above and below; they average about a tenth of an inch apart. Aperture narrow, growing proportionally broader in older shells; canal moderate, slightly twisted, inner lip lightly encrusted; outer lip acute, sinus broad and shallow.

Hab. A beach specimen retaining color, from San Diego, and a yonnger dead shell dredged from 120 fms. by Dr. Cooper. Also, two fossil specimens from P. Pliocene, Santa Barbara. The finest of these measures long. 3·, lat. 1·1; long. spir. 1·6.

Nos. 819 and 1021 Survey Moll.

## CLATHURELLA, Carpenter.

*Defrancia* Millet, non Müll.

### C. CONSTRICTA, G.

C. t. albida, solida, lævis, sub-fusiformis; anfr. VII; regione infra-suturali haud constricta; apertura lata, labio parum incrassato, labro sub-acuto; sinu posteriore profundo, suturam attingente.

Shell white, solid, smooth, sub-fusiform; whorls seven, suddenly constricted at the upper portion, near the suture; suture impressed; body whorls rapidly expanded below the constriction; aperture wide, columellar lip encrusted; canal short; outer lip acute, prominent in the middle; posterior sinus deep, angular above and adjoining the suture.

Hab. Santa Catalina Island, 80 fms. Dr. Cooper.

No. 1055 Mollusca, Survey Cabinet.

### C. CRYSTALLINA, G.

C. t. parva, fusiformis; anfr. II lævibus; anfr. normalibus IV, supra oblique planulatis, infra, convexiusculis; superficie minutis et confertim concentricis costulis instructa, media parte sola excepta, in qua sunt III vel IV costæ moniliformes; apertura lata; labio parum incrassato; labro crasso, margine sub-acuto; sinu postico profundo lato; colore candidissimo, nitente.

Long. ·35, lat. ·13, long. aper, ·16.

Shell small, fusiform; nuclear whorls two, smooth, normal whorls four, obliquely truncated above, angulated, below the angle somewhat convex; surface marked by numerous small revolving ribs, except on the middle of the whorls, where they are larger, more distant and ornamented by small nodes; aperture rather broad; inner lip lightly encrusted; outer lip thickened behind, sub-acute on the margin; posterior sinus moderately deep, round and with a polished and thicked margin, placed close to the suture; canal very slightly twisted; color, a pure white, polished.

Hab. Catalina Island, 40 fms. Dr. Cooper.
No. 1052, Mollusca, Survey Cabinet.

## DAPHNELLA, Hinds.

### D. clathrata, G.

D. t. parva, fusiformis, tenuis; anfr. III nucleosis, lævibus; anfr. normalibus III + supra oblique truncatis; superficie confertim clathrata; striis radiantibus obsoletis circa basim; apertura magna; columella parum tortuosa; labio parum incrassato; labro acuto; sinu postico sub-profundo, supra acuto, ad suturam attingente; colore albido, sparsim brunneo punctato.

Long. ·37, lat. ·14, long. aper. ·22.

Shell small, fusiform, thin, aperture longer than the spire; nuclear whorls three, smooth: normal whorls three or more, obliquely truncated above, convex below, this truncation is partially obsolete on the last whorl; surface closely clathrate, except on the lower part of the last whorl where the radiating lines become obsolete; aperture large, columella somewhat twisted, slightly encrusted; outer lip thin, acute, posterior sinus moderately deep and narrow, adjoining the suture and angular at its upper corner; color, brownish white with minute brown spots sparsely scattered, usually placed on the larger of the revolving ribs.

Hab. Santa Catalina Island, 60 fms. Dr. Cooper.

This little shell looks not unlike the young of *Pleurotoma Carpenteriana*, *supra*, but on a critical comparison, shows several characters incompatible with such a reference; the strongest of these is the peculiar shape of the posterior sinus. In addition to this, the whorls of the present species are much more numerous in proportion to the size, the first six whorls of *P. Carpenteriana* making a shell three or four times the diameter of this one.

No. 1053, Mollusca, Survey Cabinet,

## MANGELIA, Leach.

### M. hexagona, G.

M. t. parva, fusiformis, gracilis; apice sub-acuto; anfr. II lævibus; anfr. normalibus V, costis radiantibus VI acutis induta; tota superficie minute et confertim clathrata; colore albido, lineis rufo-brunneis spiralibus fasciato; apertura angusta; columella vix tortuosa, labro acuto; sinu postico lato, haud profundo.

Long. ·34, lat. ·1, long. aper. ·15.

Shells small, slender, fusiformis; spire sub-acute, nuclear whorls two, smooth, normal whorls five, slightly sub-angular and ornamented by six large acute radiating ribs with broad concave interspaces; besides these, the whole surface is cancellated by minute raised lines; color brownish white ornamented by a few reddish brown revolving bands, one much larger than the rest, in the middle of the whorl; aperture narrow, columella very slightly twisted; outer lip acute, sinus almost obsolete.

Hab. one specimen from Catalina Island, 40 fms., another from the beach at Monterey. Dr. Cooper.

No. 425, Mollusca, Survey Cabinet.

## TURBONILLA, Risso.

*Chemnitzia*, d'Orb.

### T. GRACILLIMA, G.

C. t. elongata, gracili, albida vertice? ; anfractibus XI (?) subplanatis ; sutura impressa ; costis radiantibus, circiter XXIII obtusis, sub-obliquis, ad basin evanidis ; apertura sub-rotunda ; columella incrassata.

Long. ·32 ?, lat. ·06, long aper. ·04.

Shell small, very slender, long, white ; vertex broken ; whorls eleven or more, flattened on the sides ; suture strongly impressed ; ribs about twenty-three, large, obtuse, running from the suture to the margin of the base ; base convexly subtruncated, smooth ; aperture subcircular ; columella thick.

Hab. Monterey ; a single specimen. Dr. Cooper.

This shell can be readily distinguished by its extremely slender form and the strong, slightly oblique ribs.

## CANCELLARIA, Lam.

S. Gen. *Narona*, H and A. Ad.

### C. (N.) COOPERII, G.

C. t. subfusiformi ; anfractibus II lævibus ; anfr. VII sub-angulatis ; regione infrasuturali excavata, angulo coronato ; regione infra-angulari oblique costata ; costis circiter XII ; tota superficie concentrice et confertim lirata ; colore luteo lineis fuscis regulariter et concentrice lirato ; canali elongato ; columella vix tortuosa ; plicis II ; umbilico nullo ; labio parum incrassato ; labro acuto.

Long. 2·4, lat. 1·05, long. aper. 1·25.

Broadly subfusiform, nuclear whorls two, smooth, round ; normal whorls seven, subangulated, concavely excavated above the angle ; angle acutely tuberculated ; below the angle the surface is ornamented by about twelve slightly oblique ribs, each rib ending in a tubercle at the upper angle ; the whole surface is ornamented, besides these ribs, by small, closely placed, revolving ribs ; color yellowish brown crossed by about a dozen brown revolving bands ; these bands usually cover the larger of the concentric ribs ; canal elongate , columella but slightly twisted ; umbilicus obsolete ; inner lip but slightly encrusted, bearing two sharp oblique folds ; outer lip acute, simple.

Hab. One beach specimen, San Diego ; another inhabited by a crab, Monterey, 10 fms., and a fragment much larger than the others, Monterey, 16 fms. All collected by Dr. Cooper.

No. 463, Mollusca, Survey Cabinet.

## CALLIOSTOMA, Swains.

*Zizyphinus*, Gray.

### C. TRICOLOR, G.

C. t. conica, spira vix elevata ; anfr. I nucleari, lævi ; anfr. VI ad marginem truncatis, supra declivibus, infra planulatis ; tota superficie confertim costata ; costis minute granulatis ; colore fulvo. lineis purpureis albo maculatis, spiraliter fasciato ; apertura subquadrata, intus margaritacea ; labio crasso, labro acuto ; umbilico albo.

Long. ·45, lat. ·5, long. aper. ·19, lat. aper. ·24.

Shell conical, spire somewhat elevated, nuclear whorls smooth; other whorl sloping above, truncated on the margin, nearly flat below; surface marked by numerous, finely granulated, revolving ribs; color yellowish brown, banded by a variable number of spiral purple lines, interrupted by white spots; aperture subquadrate, nacreous within; inner lip heavy, outer lip and base acute, umbilicus white.

Hab. San Pedro, five alive on the sand shoal; and Half Moon Bay, beach; also San Diego. Dr. Cooper. Also fossil in the Post Pliocene, San Pedro.

No. 602, Mollusca, Survey Cabinet.

The brown lines are variable in number, the under side of one specimen showing two and of another six of these lines. The granulation of the ribs is arranged in the lines of growth.

### N. Gen. PTYCHOSTYLIS, G.

Testa Calliostomati similis, conoidea; spira elevata; apertura subquadrata; columella antice truncata, plicis obliquis duabus induta, labro acuto, umbilico nullo.

Shell resembling Calliostoma, Swains, (*Zizyphinus*, Gray,) conical not umbilicate, internally pearly, spire moderately elevated; aperture subquadrate; columella bearing two oblique folds, the lower of which ends abruptly at the end of the columella; outer lip and base acute, smooth or internally striate; operculum unknown.

### P. CAFFEA, G.

T. conoidea, tenui; spira elevata; anfr. I nucleari, lævi, anfr. V ad marginem subangulatis, supra recte declivis, ultimo infra sub-planato; sutura valde impressa; tota superficie concentrice tuberculato costata; costis circitur XVIII ad ult. anfr.; epidermide flavida; apertura oblique sub-quadrata, intus albida.

Long. ·55, lat. 58, long. aper. ·26, lat. aper. ·28, ang. diverg. 58°.

Shell conical, thin; spire elevated; one nuclear whorl, smooth, five perfect whorls, subangulated at the margin, obliquely flat above; body whorl very slightly convex at the base; suture strongly impressed; surface marked by revolving tubercular ribs, about eighteen on the body whorl, one broad one on the margin and about eight or nine on the under side; these ribs are less numerous on the preceding volutions, only four can be counted on the upper side of the penultimate whorl; the tubercles are arranged so as to present an irregular quincunx; epidermis a rich coffee brown, darker between the tubercules than on their summits; aperture obliquely quadrangular, outer lip and base acute, internally pearly white, columella bearing two strong folds, the lower one of which borders the truncated end and terminates in a faint tubercular enlargement; behind the columella is a slight groove running from the base to the end of the upper columellar fold.

Hab. Monterey, 20 fms. Dr. Cooper. Also fossil, not rare, in the Post Pliocene of San Pedro and Santa Barbara, where some specimens have been found an inch in height.

No. 355, Mollusca, Survey Clloection.

This shell appears to be allied to the genera *Calliostoma* and *Thalotia*, from which it is separated by the peculiar mouth. In the absence of the operculum, it is impossible to define its position certainly.

## EMARGINULA, Lam.

### E. BELLA, G.

E. t. alba, oblongo-ovalis, subelevata, antice parum convexa, postice excavata, parte anteriori angustiori; apice excentrico, prominente, parum recurvato; sinu mediocri; costis radiantibus circiter XIX cum costis minoribus interstitialibus irregularitur alternantibus, per lineas concentricas clathratis.

Long. ·55, lat. ·36, alt. ·22.

Shell oblong oval, somewhat elevated, narrowest anteriorly; apex excentric, posterior, prominent and somewhat recurved; outline in front of the apex slightly convex, from the apex to the posterior margin slightly excavated, sides descending nearly straight; sinus moderate, variable, situated at the extremity of a strong rib; surface ornamented by about nineteen large radiating ribs, with smaller ones interposed, all crossed by moderately prominent concentric ridges; color white.

Locality Monterey, Dr. Cooper. "Two dredged dead."

No. 466, Survey Mollusca.

## GADINIA, Gray.

### *S. Gen. Rowellia*, Cooper.

Animal tentaculis ultra testam porrectis, latis, compressis, margine anteriori rotundato, pectinato; pes mediocris, circularis.

Testa *Gadiniæ* similis.

Animal with broad flat tentacles, rounded and pectinated in front, projecting beyond the shell; foot moderate, round. Shell as in *Gadinia*.

### G. (R.) RADIATA, Cooper.

Animal album; testa sub-circularis; apex centralis; color albus vel ex albo virens; superficies XXX costis radiantibus dichotomis induta, per lineas concentricas cruciatis; intus alba vel livida, margine crenulato; fovea siphonalis bene impressa, margo prope extremam foveam parum incisus.

Long. ·90, lat. ·85, alt. 45.

Animal white; shell sub-circular; apex central or sub-central; color white to greenish externally, internally white, livid or various shades of a light purple; surface marked by about thirty radiating and sometimes dichotomous ribs crossed by irregular concentric lines; internal margin crenulated, the teeth corresponding to the external ribs; muscular scar horseshoe-shaped with a little supplementary scar adjoining the left limb; siponal groove rather strongly impressed, producing a very faint emargination on the edge of the shell.

Localities, Farallone Islands, Half Moon Bay, New Year's Point, Santa Barbara and Santa Catalina Islands. Cooper and Rowell.

No. 826, Mollusca, Survey Cabinet.

## TYLODINA, Raf.

### ? T. FUNGINA, G.

T, testa sub-elliptica, elevata; apice sub-centrali; epidermide rufo-brunnea, prope apicem lutea, ultra marginem testæ projecta; intus lutea, prope marginem cærulescens.

Long. 1·3, lat. 1·1, alt. ·5.

Animal unknown, shell sub-elliptical, elevated; apex sub-central, blunt; epidermis reddish brown, yellowish on and near the apex, projecting beyond the margin of the shell; color internally straw yellow, shading towards the margin into a bluish white.

The above measurements are approximate, making allowance for the epidermis which in the dry specimen is contracted and incurved around the margins to a width of about a tenth of an inch.

A single specimen, fresh, though without the animal, was found by Dr. Cooper on the shore of Santa Barbara Island.

No. 994, Mollusca, Survey Cabinet.

## CIRCE, Schum.

### S. G. *Lioconcha*, Morch.

### C. (L.) Newcombiana, G.

C. t. tenui, trigono-ventricosa, polita, minute et concentrice striata; apicibus magnis, subcentralibus; lunula haud profunda, cordata, margine arata; colore gilvo, lineis angulatis, rufis picto; intus pallida.

Long. 1·2, lat. 1·37, alt. ·45.

Shell thin, trigonally ventricose, polished, marked by minute concentric striæ; beaks large, subcentral; anterior end prominent, narrowly rounded, posterior a little the widest, base convex; lunule not excavated, bounded by an impressed line; color yellowish white, variously lined with brown angular lines; interior whitish; internal margin smooth; hinge teeth delicate.

Hab. two valves, Catalina Island, 120 fms. Dr. Cooper.

No. 1058, Mollusca, Survey Cabinet.

The relative length and width of the two specimens is different, the smaller specimen not being so convex at the base as the one measured.

## YOLDIA.

### Y. Cooperii, G.

Y. t. tenui, compressiuscula, valde inæquilaterali, antice angusta, postice expansa; umbonibus minutis, per positionem anteriorem excentricis; epidermide olivacea, nitida; concentrice et confertim lirata; liris minutis, sub lamellosis; intus lactea; cicatricibus muscularibus magnis.

Long. 1·25, lat. 2·6, alt. ·25.

Shell thin, somewhat compressed, very inequilateral, beaks placed about a third of the length from the anterior end, minute; anterior end narrow, sub-acuminate, posterior end broadly rounded; base most prominent just posterior to the middle of the shell; surface sculptured by numerous small concentric ribs, rarely dichotomous or anastomosing on the widest part of the shell; these ribs are flat and abruptly truncated on the side nearest the beak, giving the surface, under a glass, the appearance of an overlapping. Epidermis shining, olivaceous; internally a which more than one shock has taken place within the twenty-four hours of each day.

The *British Colonist*, of Victoria, Vancouver Island, furnishes the following statement:

From a gentleman who has resided on Vancouver Island for 15 years, we learn that slight earthquakes have occurred annually, with one or two exceptions, during the entire period. Only on one occasion (1858) does he remember experiencing a shock at all approaching in severity that of Saturday morning, October 29th 1864. The oscillation, as on this last occasion, has almost invariably been from west to east: and he accounts for this, by supposing that the internal convulsion of the earth beneath, has to find vent in the crater of Mount Baker, situated to the east of us. This volcano has not had any visible eruption for several years. On the last occasion, it sent up a dense volume of smoke, and occasionally a bright flame was seen to issue from the fiery furnace. Another old resident informs us, that the appearance of the summit of Mount Baker has undergone a material change within late years, giving room for the conjecture that large portions have crumbled away and descended into the yawning abyss of the crater which lies between the two highest peaks."

Relating to earthquakes at San Francisco and its immediate vicinity, we have an item of interesting information relating to their effects at the Farrallones Islands, situated some fifteen miles to the west of the city. It appears, upon the testimony of the lighthouse-keeper at these Islands, and who has resided there for several years, (seven or eight), that but *two* of the whole number occurring at this city, have been felt at the Islands, and of these he made an official record. The first was the shock of Dec. 23d, 1862, and that of June 22d, 1864.

From 1857 to date, we have seven years, during which time twenty-five shocks have been authenticated at San Francisco, while two only of the number have been felt at the above locality west of the city.

## Regular Meeting, Jan. 16th, 1865.

Dr. Kellogg in the chair.

Twelve members present.

Mr. Melville Attwood was elected a resident member.

A communication was read from Rev. J. M. Neri, acknowledging his election; also one from M. Le Normand.

## Regular Meeting, Feb. 6th, 1865.

President in the chair.

Fourteen members present.

Mr. Charles F. Hoffman was elected a resident member.

Prof. J. D. Dana, of Yale College, was elected a Corresponding member.

Prof. W. P. Blake communicated the following:

## New Mineral Oil Regions in the Tulare Valley.

BY WILLIAM P. BLAKE.

Recent examinations of prospecting parties, have added largely to the well-known oil-bearing portions of the State. A district some sixty miles in length, on the inner slopes of the Coast mountains, towards the Tulare Valley, has been found to abound in oil springs, or indications of oil. Oil exudes from the surface in large quantities, and collects rapidly in small pits sunk by prospectors. The soil about these pits is very black and saturated with oil. The gases escaping from this soil are inflammable, and many of the prospectors have been startled to see flames spreading over the ground, beyond their camp fires. In digging pits about these springs, large quantities of bones of various kinds have been thrown out, and all are wonderfully well preserved. These bones appear chiefly those of the horse, deer, and elk, though there are many others which I have not been able to recognize. The teeth of the horse, sent to me, are of unusual size, and induce the question, whether they are not of greater antiquity than the present race of horses. I am assured that the variety of bones and teeth of many kinds is very great.

The oil found gives an excellent article for lubricating purposes, and must be very similar to the oil found near Zanesville, Ohio, according to the descriptions given of the latter.

## Note upon the occurrence of Sphene in the Granite of the Sierra Nevada.

BY WILLIAM P. BLAKE.

Sphene, in small hair-brown or amber-colored crystals, appears to be abundantly distributed in the granite of the Sierra Nevada. It may be found at the sources of the American River, in the exposures of granite about Slippery Ford, and other points, and upon the Mokelumne River, further south. The crystals are seldom more than the thirty second part of an inch in diameter, and are not conspicuous, but may be found in almost any specimen of the rocks.

It appears, that this mineral is also of common occurrence in the granite of the British Islands. In a report to the British Association, (1863) upon the composition of the granite of Donegal, it is stated, that the rock contains, almost universally, small crystals of sphene, in some varieties so abundantly, as to induce the authors of the Report to term it "sphene granite." It is also observed that this mineral has long been known to exist in the granite of parts of Scotland, and in that of Galway.

### Regular Meeting, February 20th, 1865.

Dr. Kellogg in the chair.

Ten members present.

Discussion as to various matters pertaining to Natural History.

---

### Regular Meeting, March 6th, 1865.

President in the chair.

Twelve members present.

William Hillebrand, M. D., of Honolulu, S. I., was elected a corresponding member.

Donations to the Cabinet: Dr. Behr, in behalf of Mr. Smith, presented a curiously formed chicken, having four legs.

---

### Regular Meeting, March 20th, 1865.

President in the chair.

Twelve members present.

Mr. Otto Schmidt and Dr. E. Cohn were elected resident members.

Donations to the Library; Descriptions of new species of Birds; presented by the author, Mr. George N. Lawrence. Catalogue of the College of California, 1864–5; Proceedings of the Essex Institute, Vol. 4, No. 4; Supplementary Catalogue of the Library Company at Philadelphia; Proceedings of the Academy of Natural Sciences of Philadelphia, for September and October, 1864.

Dr. Behr read the following letters from Major Preiss, of

Mazatlan, as to the efficacy of the *Euphorbia prostrata*, as a remedy for the bite of the rattlesnake and venomous insects:

## Euphorbia Prostrata as a remedy for the bite of venomous animals.

### BY MAJOR EDWARD PREISS.

Mazatlan, January 7th, 1865.

* * * * * * *

I send you herewith a sample of Gollindrinera, (Spanish,) ***Euphorbia prostrata***, (Linn,) It is found growing in the territories of New Mexico and Arizona, in the United States, and the provinces of Sonora and Sinaloa, in Mexico. In Jalisco this plant is more scarce, and occurs mostly in a poor condition.

It thrives in hard, sandy or stony soil, and therefore is most frequently found on roadsides, in the streets of villages and in house-yards. In Mazatlan I found a plant with branches, measuring two feet.

It is a remedy against the bites of snakes and other venomous animals

During my voyage in New Mexico, I camped on the 5th of June, 1864, at noon, between Cubera and Pawate, near a waterhole. A Pueblo-Indian approached me, and entered into a conversation. He could read and write Spanish, and was very well versed on the map of the country. Noticing a snake in the waterhole, I asked him whether there were many rattlesnakes in those parts, to which he gave an affirmative answer. On questioning him whether Indians frequently died from snake-bites, he answered: "No, as they have an antidote against the poison." At my request, accompanied by a gift of some cigarritos, he brought me a plant, which he gathered from the roadside, and which he called "Gollindrinera." He told me that nobody ever died, not even from the bite of a rattlesnake, if this plant was applied in time. At the same time he told how it was used.

In Mexico I also found the country people well acquainted with the property of this plant. They apply it when their domestic animals are injured by venomous amphibia or insects.

The branches and roots of this plant contain a quantity of a milky sap. This is obtained by pounding and squeezing the plant, and is given to the patient in doses of about one drachm. The remaining fibres of the pressed-out plant are externally applied on the wound. The dose is repeated every hour,—or in aggravated cases, every half hour,—until the patient feels relieved; which will occur in a few hours. The external application must be frequently renewed.

I ascertained from reliable authority, that two dogs, being bitten by rattlesnakes, were cured, one after four, and the other after six repetitions of the dose. The poultice was frequently changed. Both dogs were perfectly restored within twenty-four hours.

Tepic, March 28th, 1865.

* * * * * * *

Myself and companion arrived on the 14th of March, 1865, at 3 o'clock P. M., at San Blas. In the evening, our faces, necks and hands were badly bitten by myriads of sandflies. The sting of these flies is exceedingly painful, and the effects of them last for several days. Every person visiting San Blas will not easily forget these insects; each sting produces a reddish swelling, which hardens after awhile, and sometimes remains for eight days and more. We left San Blas on the 15th of March, at 1.30 A. M , and arrived at 5 P. M. at Tepic. The fly-bites were excruciatingly painful. On the 16th we used liquid ammoniac to allay our suffering, but without result. In the forenoon of the 17th I found two small Gollindrinera plants in the streets of Tepic; I pulled it, roots and all, from the ground, broke them into several parts, and rubbed the milky juice over my sores. In half an hour all the pain had left. Not being able to find any more of the plants, my companion had to suffer for several days longer; which proves, however, that my relief from the tormenting pain was directly to be credited to the medical virtue of the Gollindrinera.

During my lengthened stay among the natives of Australia, I observed that no black man ever died from the bite of a venomous reptile,—excepting always the dead-adder, (bothrops)—while a white man seldom escaped death. The remedy of the blacks is very simple, consisting merely in sucking out the wound, and in keeping awake the patient for at least twenty-four to forty-eight hours. The dead adder (bothrops) of Australia is probably the most poisonous reptile. A black man, if bitten by this snake, will be abandoned to death by his friends, they being sure that help is out of the question. I witnessed once the death of a victim of the dead-adder.

I read in an Australian paper, that a white boy, who was bitten in the finger by a dead-adder, had so much presence of mind, as to chop it off with his pocket-knife. The finger had afterwards to be regularly amputated, but the boy's life was saved.

An interesting discussion occurred as to the characteristics of various species of trees.

---

## Regular Meeting, April 3d, 1865.

President in the chair.

Nine members present.

Donations to the Library: Col. Ransom presented a bound copy of Vols. I and II of the Society's Proceedings.

Dr. Kellogg exhibited from the Academy's herbarium, accompanied by a drawing and description, a new species of

*Pentachæta*, very abundant on the dry hills of Marin County—*Pentachæta purpurea* of Kellogg.

## REGULAR MEETING, APRIL 17th, 1865.

Dr. Behr in the chair.

Seven members present.

Mr. Stearns made some remarks, and offered an appropriate resolution on the death of President Lincoln, which was ordered to be spread upon the Minutes, after which the meeting adjourned.

## REGULAR MEETING, MAY 1st, 1865.

President in the chair.

Ten members present: Messrs. Kennicott, Dall and other gentlemen connected with the Russian American Telegraph Expedition as visitors.

Donations to the Cabinet: Specimens of native copper and native silver from the Copper Falls Mine, Keewenaw Point, Lake Superior, presented by Mr. Stearns.

Donations to the Library: Four volumes of the Congressional Globe: Finance Report, 1864; Report on the Foreign and Domestic Commerce of the United States; Patent Office Report, (Agriculture,) 1863; from the Hon. John Conness. Embryology of the Star Fish, by Alexander Agassiz, presented by the author; Annual Report of the Museum of Comparative Zoology of Cambridge; Proceedings of the Essex Institute, Vol. III, 1860-63; Silliman's Journal for March, 1865; Proceedings of the American Academy of Arts and Sciences.

The following was received from Prof. W. H. Brewer, in reference to the occurrence of fossils in the auriferous slates of California:

## Occurrence of Fossils in the Auriferous Slates of California.

BY PROF. W. H. BREWER.

I find in published *Proceedings of the Academy*, just received, that some remarks I made at the meeting of October 3d, 1864, were not published, that I wish recorded.

In the discussion on the occurrence of fossils in the auriferous rocks of California, I stated that fossils had been found by the Geological Survey, in the rocks associated with gold, along a line nearly 300 miles in length, extending from Pitt River to the Mariposa Estate; that the associated rocks of similar age, bearing gold, had been traced upwards of 550 miles in the Sierra Nevadas, and that *Jurassic* fossils had been found in the "auriferous slates," along a belt of 200 miles of this distance, and that both *Jurassic* and *Triassic* fossils had been found in considerable numbers near and in Genesee Valley, Plumas Co.

## REGULAR MEETING, MAY 15th, 1865.

President in the chair.

Eight members present.

Mr. John Klippart, of Columbus, Ohio, was elected a corresponding member.

Dr. Kellogg called the attention of the Academy to the *Œnotheræ graciliflora*, with a variety of the same. Mr. Bolander made some remarks upon the isolated position of the Red-woods upon the hills back of Oakland.

## REGULAR MEETING, JUNE 5th, 1865.

President in the chair.

Eleven members present. Dr. C. T. Jackson, R. Kennicott, and W. H. Dall, visitors.

Donations to the Cabinet: Marine shells from the neighborhood of Hong Kong, by Mr. Stearns.

Donations to the Library: Notes on the habits of some species of Humble Bees, and the Humble Bees of New England, by F. W. Putnam and A. S. Packard, Jr., presented by the authors; Proceedings of the Academy of Natural Sciences of Philadelphia, for November and December, 1864.

Messrs. Kennicott and Dall made some remarks on the workings of the Essex Institute.

Dr. Jackson spoke of the progress and condition of the Boston Society of Natural History.

Dr. Jackson also mentioned the discovery by him, in the Mammoth Mining District, near Austin, Nevada, of Tungstate of manganese and Tungstate of lime.

---

## REGULAR MEETING, JUNE 19th, 1865.

President in the chair.

Nine members present.

Donations to the Cabinet: Specimen of coral from the Farallone Islands, by Mr. Hubbard; Specimens of silver and copper ores and cinnibar from Mexico, by the Editor of *La Voz de Mejico;* Skull of the Sea-otter, (dug out of the sand near the Cliff House,) by Mr. Daniel E. Webb; Fibrous bark from China, by Mr. C. A. McNulty.

Donations to the Library: Notes on the Genus Gundlachia and of the fossil crab of Gay Head, by Dr. Wm. Stimpson; Proceedings of the Philadelphia Academy of Natural Sciences for January, February and March, 1865; Silliman's Journal, May, 1865; Annual Report of the Museum of Comparative Zoology of Cambridge; Report of the ninth census of the U. S.

Mr. Hubbard presented the following paper from Mr. W. H. Pease, of Honolulu:

### On the existence of an Atoll near the west coast of America, and proof of its elevation.

BY W. HARPER PEASE, OF HONOLULU, H. I.

Having read an interesting paper by Dr. Blake, in a late number of the *Proceedings California Academy*, on the proofs of a recent elevation of the coast of California, it occurred to me that I had in my note book, information unpublished on the same subject. As it lies within the field occupied by your Academy, I furnish it herewith for publication. My information was gathered from a Journal kept by Lieut. Griswold,[*] (a young gentleman of scientific taste, and a close and accurate observer,) during a cruise off the west coast of Mexico, in search of guano. Among the islands visited, was "Clipperton Rock," which is the locality I refer to.

Before giving any extract, I will state what was known of the island.

It is situated in Lat. 10° 17′ N., Long. 109° 19′ W., and was discovered by Capt. Clipperton, in 1705, He appears to have sighted only the tall volcanic rock, which stands near the south end of the island, and passed on without learning of the existence of the island. It appears not to have been noticed again for more than a century, so that its position, and even its existence was doubted.

The only published account of its having been visited since, are those by Capt. Benj. Morrell[†] and Sir Edward Belcher.[‡] The former called there during a sealing voyage, in 1825, and gives a meagre account of it in a few lines, remarking, that "it produces a little shrubbery and some coarse grass, among which, I think, fresh water might be found by digging. Among the few vegetable productions of this island, we found a plant resembling sarsaparilla, which badly poisoned several of the crew who handled it."

Sir Edward Belcher, during his surveying expedition, wishing to verify the existence and position of the island, searched and found it. He did not land, but gives the result of his examination from the mast-head. With other remarks, he states that "it is a coral lagoon island, three miles long N. and S., and the same E. and W. There are two entrances, both on the weather side, which at high-water may be safe, but at the moment we passed, the surf was too heavy and the reflux showed the rocks bare. On the beach several large trees were observed, but no living trees were seen." (May 8, 1839.)

Lieutenant Griswold notes in his journal, as follows: "On the 6th of August, 1861, we lay on our oars, just outside the breakers on the N.E. side. At half past six we were ashore, shooting in on a high roller, which left us high and dry upon the beach, with a hole stove in our bow. The beach was covered with drift wood, and while the crew were collecting it, I started to examine the island.

Upon every side it is girdled by a broad barrier of coral, about fifteen feet above the level of the ocean. There is no entrance to the lagoon, neither does it communicate with the ocean by subterranean passages, as the water inside is ***fresh*** and ***potable***. It is slightly brackish, but will appease thirst. The 'ROCK' is a ragged pile of volcanic formation, on the south end of the island, gray and splashed over with the deposit of the birds. It is cracked and split in every possible direction, here and there shooting into tottering pinnacles. As you wander through the caverns and clefts, with which it is perforated, there is an incessant splashing and dropping of water. On the very topmost pinnacle, which

---

[*] Lieut. Griswold was killed at the head of his regiment, gallantly leading them into action, at the battle of Antietam.

[†] A narrative of four voyages to the South Seas, &c., by Capt. Benj. Morrell. N. Y., 1832, page 219.

[‡] Narrative of a voyage round the world in H. M. S. *Sulphur*, by Capt. Sir Edward Belcher. London, 1843. Vol. II, page 219.

I reached after a hard climb, I found a little basin containing a couple of buckets full. The caverns were dreary looking places, dark and wet, and echoing to the hoarse cries of the sea-birds. The rock, on its sides, is rounded and smoothed by the action of the waves, at some long past time, and in many places '*the walls are crusted with coral.*'

"The highest pinnacle of the rock is about 120 feet high, and it covers, I should think, about two acres. It stands on the edge of the lagoon, or rather within it, being connected with the coral barrier only by a narrow isthmus of coral clinker. Between this rock and the sea, however, the barrier, instead of being as elsewhere, a solid platform of coral, is only a heap of fragments, piled in winrows by the waves, 250 or 300 yards in width. The lagoon is a quiet fresh water pond, two miles long and about one broad, with a long spit of mud running out into the middle of it, but elsewhere of a light green color, which seemed to indicate a considerable depth. Its shores are abrupt, the coral platform in most places projecting out over water of a considerable depth. I did not find the least sign of vegetable life upon the island.

"The only plant* seen, grew in considerable quantities in the lagoon, which I pulled out of the water, where it was growing. There is nothing but a coral platform, coral clinker and coral sand. We found nothing to detain us and left the island on the afternoon of the day on which we landed."

Mr. Darwin, on his remarks on the geographical distribution of reef-building corals, states that he could find no evidence of their living on or near the west coast of America, and consequently discredits the statement made by Sir Edward Belcher; for after examining a Ms. chart of Clipperton Rock, at the Admiralty Office, drawn by Sir Edward, came to the conclusion that it was more of the shape of a crater. The Island is, however, a true Atoll and has been elevated at least 100 feet.

It must have been closed since 1839, and the freshening of the water has probably been caused by rain.

We may also add, that it stands within the limits of reef building corals, as deduced by Mr. Dana, from tables of the temperature of the sea, and consequently is confirmatory of his opinion.

We might add other facts in support of Mr. Dana's theory, but from other parts of the Pacific.

Discussion as to the adaptation of certain semi-tropical plants to the climate of California.

## REGULAR MEETING, JULY 3, 1865.

President in the chair.

Eight members present. Prof. John Torrey, R. Kennicott W. H. Dall, Horace Mann, and Capt. Wright, visitors.

---

* Specimens of the plant referred to by Mr. Pease, were received by the Academy.

Donations to the Cabinet: A collection of Rocky Mountain plants, by Mr. Bolander.

General discussion as to the motions of the Flying-fish.

Remarks by Mr. Kennicott and Dr. Behr upon the relation of the Esquimaux to the North American Indians. Dr. Behr stated that the Esquimaux could be considered only as a kind of Indians, their language being of the same structure, and their different habits were owing to physical influences. He further stated, that the Esquimaux lived formerly farther south. Mr. Kennicott remarked, that from his observations and information derived from Madam Roshkin and from St. Zagoshins' Report, he believed the natives, for some hundreds of miles up the Kvichpak or Yonkon River, were Esquimaux rather than Indians.

Dr. Torrey stated, that he found on a trip to the Yo-semite Valley, a plant that he described twenty years ago, and which he had not since seen in the collections examined by him. He named the plant, finding it to be a new genus *Kelloggia;* the plant is quite common in the valley and vicinity, and belongs to the family of Rubiaceæ; the aspect of the plant is, in regard to its ramification, much like that of a *Galium*, while its leaves and their arrangement resemble an *Epilobium*. It was first discovered by some member of Com. Wilke's Expedition, somewhere along or near the Sacramento River.

Dr. Torrey also stated that he found *Sarcodes Sanguinea*, (Torrey), the Snow-plant of the Californians, to be apparently indifferent as to what plant it fixes itself or derives its nourishment from; he found its fibre penetrating into the root of a *Rumex*, and not as has been supposed into the roots of *Sequoia gigantea*. He also spoke of the great beauty and fragrance of the California White Lily, *(Lilium Washingtonianum,)* and of its being quite common in the vicinity of the Yosemite Valley. Its habits are much like that of the common white lily, *(Lilium candidum)*.

This evening, at 7 o'clock, a magnificent rainbow was observed, the colors of which were unusually vivid.

### REGULAR MEETING, JULY 17th, 1865.

President in the chair.

Ten members present.

---

### REGULAR MEETING, AUGUST 7th, 1865.

President in the chair.

Nine members present: Dr. C. T. Jackson, visitor.

Donations to the Cabinet: Three boxes of shells; Duplicate fossils of the U. S. Exploring Expedition; Types of Dana's Geology; Fossils from the Upper Missouri; Miscellaneous fossils of the United States, received from the Smithsonian Institution; Trachytic porphyry from the "Basalt" Cliff, three miles from the Big Tree Grove, Calaveras, presented by Dr. Jackson.

Donations to the Library: Annual Report of the Museum of Comparative Zoology of Cambridge, 1864; Proceedings of the Academy of Natural Sciences of Philadelphia, for January, February and March, 1865; Proceedings of the American Academy of Arts and Sciences, June–September, 1864; Review of American Birds, by Prof. S. F. Baird; Proceedings of Albany Institute; The Law of Increase and the Structure of Man, by F. A. Liharyik; Oration and Poem delivered at the Commencement of the College of California; Proceedings of the Royal Horticultural Society of London; Meteorological Results, Toronto, 1860-2; Magnetical Abstracts, Toronto, 1854-50, 1856-62.

Dr. Ayres remarked the appearance of a species of Barracouta, *(Sphyrena Argentea,)* on the coast of California, off Point Conception.

Dr. C. T. Jackson read the following paper, relative to the

## Big Trees of Calaveras County.

### MEASUREMENTS OF THE HEIGHT AND CIRCUMFERENCE OF TWENTY-FIVE OF THE "BIG TREES," (*SEQUOIA GIGANTEA,*) IN CALAVERAS COUNTY, BY DR. CHARLES T. JACKSON AND MR. JOSEPH B. MEADER, AUGUST 2D AND 3D, 1865.

Instruments made use of:—

1. Sir H Douglass' Reflecting Semicircle; (Cary).
2. A Reflecting Level; made by J. H. Temple, of Boston.
3. A common Measuring Tape.

The horizontal point was fixed upon each tree, and the angle measured by the Reflecting Semicircle, and protracted by it.

The circumference of the trees was measured above the swell of the roots, about six feet, where the stem takes its proper form.

Several measurements, originally made with too high an angle, were taken over again with a longer base, so as to avoid the error of refraction in the glasses of the mirrors.

We trust, therefore, that the following measurements will be found to be correct.

| NAME OF TREE. | HEIGHT. Feet. | CIRCUM. Feet. |
|---|---|---|
| Arbor Vitæ Queen | 258 | 31 |
| Pride of the Forest, | 260 | 50 |
| Andrew Johnson | 273 | 32 |
| Bay State | 280 | 48 |
| Edward Everett | 265 | 46 |
| Henry W. Beecher | 291 | 45 |
| William C. Bryant | 305 | 49 |
| Abraham Lincoln | 281 | 44 |
| Mother of the Forest[*] | 305 | 63 |
| Daniel Webster | 270 | 49 |
| General Jackson | 320 | 42 |
| General Scott | 327 | 45 |
| General Washington | 284 | 52 |
| Beauty of the Forest | 258 | — |
| Two Sentinels | 315 | — |
| Old Kentucky | 277 | 45 |
| Mother and Son | 269 | 64 |
| T. Starr King | 366 | 50 |
| Trinity | 308 | 48 |
| Salem Witch | 310 | — |
| Henry Clay | 241 | 44 |
| Empire State | 275 | 50 |
| Vermont | 259 | 44 |
| Granite State | 286 | 50 |
| John Torrey, (Nobis) | — | 50 |
| (All the above-named trees are the *Sequoia Gigantea.*) | | |
| A Sugar Pine, (*P. Lambertiana*) | 165 | — |
| A Yellow Pine, (*P. Engelmann*) | 232 | 27 |
| Another of same species | 220 | 19 |

[*] Bark off Mother of the Forest to the height of 121 feet.

The stump of the "Original Big Tree" measured in six diameters; gives for mean, 23 ft. 1½ in., diameter inside of the bark,—which was two feet thick.

## REGULAR MEETING, AUGUST 21st, 1865.

Mr. Fisk in the chair.

Nine members present.

Donations to the Cabinet: Specimen of Chromic Iron, from Tuolumne County, by Mr. Hanks.

Mr. Bolander submitted a paper on the Grasses of Arizona, with the following remarks:

The following List of Grasses, accompanied by the very judicious and practical observations of the Corresponding Member of our Natural History Society, Mr. C. J. Croft, of the 1st Cavalry California Volunteers, was received by mail from Fort Goodwin, Arizona Territory, some little time since. From the same intelligent source, we have, from time to time, received many valuable specimens, preserved with uncommon care, and reaching us in a state quite unusual, even from localities far more favorably situated. We are very hopeful, we shall shortly be placed in possession of specimens of the seed of the *White Layia Mexicana*, for ornamental culture, as also of a species of native Potato, from the same indefatigable individual, who has also furnished us with a very interesting account of numerous species of the Cactus family, of that District.

### The Grasses of Arizona.

BY C. J. CROFT, U. S. A.

The grasses of this Territory, principally consist of four varieties:

No. 1. (***Pleuraphis Jamesii***, Torr.,) is the lowland Grama which grows in great profusion along the valley of the Gila, and constitutes the principal feed for our animals, which do quite well upon it, moderately worked.

No. 2. (***Aristida purpurea***, Nutt.) The highland Grama, growing upon the sand "mesas," or highlands, seems to differ but little, if any, from that found in some portions of California.

No. 3. (***Muhlenbergia pungeus***, Thurb.) Black Grama, or, "Grama China," as vulgarly called by the natives, is the most valuable as feed; upon it animals will fatten. It grows on the highlands, in sandy arid soil. I have never met any of this variety in the valley of the Colorado, and but very little in the territory of New Mexico. At this post we have had as many as 700 animals, and the scarcity of forage required us to herd our stock upon this grass during the winter. We were often obliged to make rapid and distant marches in pursuit of Indians, over a country almost impassable, yet our horses stood it well, fed only upon this grass.

Our cavalry here had no grain during the entire winter. This Grama, like the other species, grows in bunches several feet apart, and the lower stalks are green during the winter season.

No. 4. (*Sporobolus airoides*, Trin.) This grows in the valleys. A great portion of the Gila Valley is covered with it. Animals eat it readily when green; it is however a powerful diuretic. As a winter grass it is of no account.

Besides these four enumerated grasses, the letter contained three others from the same locality:

1. *Panicum capillare*, L.
2. *Tricuspis pulchella*, Kunth.
3. *A Poa*, much of the habitat of *Poa sudetica*. Vivid green; leaves plane, rather large; spikelets four-flowered, oval; lower glume one, and the upper three nerved; lower palea distinctly three-nerved, scabrous on the Red nerve. The nerves of the glumes, as well as of the lower palea, are of a vivid green color, and exceedingly prominent. The whole aspect of the plant sent, would rather suggest that it is not indigenous to that section of the country.

---

## REGULAR MEETING, SEPTEMBER, 4th, 1865.

Mr. Minns in the Chair.

Eight members present.

Donations to the Library: A paper on the origin and formation of Prairies, by Leo Lesquereux; Report of the Vancouver Island Exploration, 1864; Review of American Birds, by Prof. S. F. Baird; Silliman's Journal for July; Proceedings of the Essex Institute, January, February and March, 1865; Illustrated Catalogue of the Museum of Comparative Zoology of Cambridge; The Naturalists' Directory, Part I.

Dr. Ayres presented the following paper from Prof. W. P. Blake:

### Note on the abundance of Iron Ore in Northern Arizona.

BY WM. P. BLAKE.

In 1863 I observed an iron formation of considerable extent and interest upon and near the William's Fork of the Colorado, near its mouth. The ore is chiefly the micaceous variety of Hematite, or "specular iron," and occurs in thick beds and in thin sheets, in a ferruginous limestone or dolomite, evidently metamorphic, and tilted up at a high angle.

It forms a belt of peculiar appearance, that may be traced by the eye for miles across the country, in a direction a few degrees south of west. This rock and iron ore is inter-stratified with chloritic and talcose slates and granite, and the series also bears copper ores and gold.

From the collections made by Lieut. Whipple's party, in 1853, in the mountains north, it would appear, that similar rocks exist in the Cerbat and Aquarius Mountains, the extreme geological antiquity of which, was commented on by me in the Pacific R. R. Reports, Vol. III, p. 59. It is possible that this ferriferous formation is connected with the extensive iron formation of the coast of Mexico, south of Acapulco, described by Mr. Manross, (Am. Journ. Sci., XXXIX, 358,) and it may be of pre-Silurian date.

## Descriptions of New Marine Shells from the Coast of California.

### PART III.

BY PHILIP P. CARPENTER, B. A., PH. D., OF WARRINGTON, ENG.

### Genus CORBULA, Lam. (Auct.)

*Corbula luteola*, Cpr. n. s. State Collection, No. 587.

C. t. "*C. biradiatæ*," formâ simulante, sed multo minore; haud obesâ, transversâ, luteo-cinereâ, dorsum versum interdum obscure biradiatâ; angulo plus minusve carinato, postice definito; antice rotundatâ, expansâ; concentrice crebre sed obtuse lirulatâ; umbonibus obtusis; intus, dentibus minoribus; linea pallii angulatâ, haud sinuatâ; cicatricibus adductoribus callosis; margine t. adultâ postice altero alterum amplectante.

Long. 0·42, lat. 0·28, alt. 0·16.

*Hab.* San Diego, San Pedro, 50, alive, at low water.

### Genus PLECTODON.* Cpr.

Testa tenuis, scaber, rostrata, haud inflata: margo dorsalis sub umbones intus nexa, dentem cardinalem formans: dentes laterales longi, laminati: cartilago fossâ minutâ, sub umbones celatâ, dente laterali postico contiguâ, sita: sinus pallii parvus.

*Plectodon scaber*, Cpr. n. s. State Collection, No. 1062.

Pl. t. *ledæ*-formi, tenui, subdiaphanâ, pallidâ; totâ superficie minute pustulosâ; marginibus dorsalibus rectis, ad angulum 150°; antice et ventraliter productâ, marginibus excurvatis; postice valde rostratâ, truncatâ: intus, margine sub umbones interrupto; plicâ ex apice oblique usque ad marginem dorsalem anticum excurrente; dentibus lateralibus laminatis, extantibus, postico longiore; cicatricibus adductoribus parvis, subrotundatis, ad extremitates dentium lateralium sitis; sinu palii lato, haud impresso.

Long. 0·62, lat. 0·34, alt. 0·20.

*Hab.* Catalina Island, two right valves, 40-60 fms, *Cp.*

---

* From the Greek, for *twisted tooth*

This very distinct genus has the aspect of Theora, and appears allied to Neæra It is probable that the cartilage was strengthened by an ossicle The great peculiarity is the twisting-in of the dorsal margin, which ascends the umbo in a very loose spiral.

### Genus MACOMA, Leach.

***Macoma indentata***, Cpr. n. s. State Collection, No. 365.

M. t. " M. sectæ " simili ; sed postice valde rostratâ, sinu inter plicam et regionem ventralem valde expansam indentato.

Long. 2·20, lat. 1·40, alt. 0·56.

*Hab.* San Pedro, (young, living, ***Palmer*** ;) large dead valves, ***Cooper***.

Differs from ***M. umbonella***, Lam., in its *secta*-like post-ligamental wing. This being rubbed off in the large dead valves, the shell has the aspect of a very distinct species.

### Genus ŒDALINA, Cpr.

(*Œdalia*, Cpr., Brit. Ass. Rep., 1864. (pre-occup.)

### Subgenus COOPERELLA, Cpr.

*Œdalina* ; cartilagine fossâ semi-internâ, ligamento externo contiguâ, sitâ ; dentibus cardinalibus laminatis, haud bifidis, seu uno bifido.

Dedicated to the memory of Judge Cooper, of Hoboken, N. J., author of the Report on the Mollusca of the Pacific Railway Expeditions.

***Cooperella scintillæformis***, Cpr. n. sp. State Collection, No. 533 a.

C. t. tenuissimâ, subdiaphanâ, latiore ; formâ " ***Scintilæ Cummingii*** " simulante; extus argenteo-iridescente, striulis incrementi exillimis interdum undatâ ; parte posticâ paullum majore rotundatâ ; intus, valvâ dextrâ dent ii. laminatis, arcuatim divergentibus, extantibus, quorum anticus major, ventraliter sulcatus ; v. sinistr. iii., quorum ant. et post. laminati, arcuati, centralis triangularis, bifidus ; fossâ cartilaginali parvâ, semi-internâ, sub umbones angustiores, satis prominentes, sitâ ; laminâ ligamentali nullâ, nymphis longioribus ; sinu pallii oblongo, lato ; lineâ pallii anticâ minus declivi.

Long. 0·60, lat. 0·48, alt. 0·32.

***Hab.*** San Diego ; San Pedro, 2 dredged in 8-20 fms. ***Cooper***.

### Genus SEMELE, Schum.

***Semele incungrua***, Cpr. n. s. State Collection, No. 1061.

S. t. formâ et indole " S. pulchræ " simili, sed sculpturâ diversâ ; transversâ, tenuii, subplanatâ, umbonibus prominentibus ; pallide carneâ, radiis intensioribus ornatâ ; totâ superficie minute et creberrime radiatim striulatâ ; marginibus dorsalibus postico rectiore, antico parum incurvato ; reliquis regulariter excurvatis, parte anticâ diagonaliter valde productâ ; v. sinistr. liris crebris subacutis concentricis, antice sæpe irregulariter interruptis, postice circiter quaternis solum conspicuis, extantibus ; v. dextr. liris paucioribus, acutis, antice vix interruptis, postice alternantibus, extantibus : intus ; dent, card. parvis, fossâ cartilaginali angustâ elongatâ ; dent. lat., v. dextrâ, elongatis, regione cardinali purpureo tinctis ; cicatr.

adduct. subrotundatis; sinu pallii maximo, ovali, ascendente, per quintas inter sex totius interstitii partes porrecto; colore secundum paginam externam tinctâ et radiatâ.

Long. 0·58, lat. 0·40, alt. 0. 16.

*Hab.* Santa Barbara, 16 fm. 1 valve; Catalina Island, 40-60 fm., not uncommon; *Cooper.*

### Genus ? VENUS, *Ln.* Subgenus PSEPHIS, Cpr. 1864.

*Psephis salmonea,* Cpr. n. s. State Collection, No. 1068.

Ps. t. Parvâ, subinflatâ, subœquilaterali, subtrigoná; colore salmoneo; extus nitidâ, minutissime et creberrime concentrice striatâ; margine ventrali excurvato; dorsalibus antico et postico subrectis: intus, dent. card. iii.-iii., quorum utrâque valvâ anticus porrectus, quasi lateralis, centrales parvi; v. dextr. dente postico in marginem sulcatum decurrente; cicatr. adduct. satis conspicuis, subrotundatis; lineâ pallii satis internâ, vix obsolete sinuatâ.

Long. 0·12, lat. 0·11, alt. 0·06.

*Hab.* Catalina Island, 30-40 fm., rare.; *Cooper.*

Placed under Psephis by analogy; whether the animal be ovoviviparous has not yet been ascertained.

### Genus ASTARTE, J. Sby.

*Astarte fluctuata,* Cpr. n. s. State Collection, No. 1060.

A. t. valde planatâ, ovoideâ, costis concentricis valde distantibus, angustis, undulatis, ornatâ; marg. dors. post. subrecto, ant. concavo, lunulâ longâ, parum impressâ; ventr. satis rotundato; ant. valde rotundato; post. subquadrato; intus, v. dextr., laminâ cardinali planatâ; dent. card. i. inter fossas ant. parvam, post. triangularem, extante; dent. lat. ant. acutiore, satis elongato, post. nullo; cicatr. adduct. ovalibus, posticâ callo definitâ; margine haud crenato; sulco ligamenti externi elongato.

Long. 0·33, lat. 0.26, 0·10.

*Hab.* Catalina Island, 30-40 fm. *Cooper.*

Only dead right valves having been found, it is not known whether this species be an Astarte (according to Messrs. Adams and Hanley) or an abnormal Crassatella. It scarcely differs from the young of *Astarte omalia*, from the Coralline Crag.

### Genus CARDIUM, Ln. Subg. FULVIA, Gray, 1847, [or Lævicardium? Sw., 1840,]

*Cardium (? modestum, var) centifilosum,* Cpr. State Collection 381.

C. t. parvâ, tenuissimâ, inflatâ, subquadratim rotundatâ; umbonibus angustis, tumidioribus; marginibus, dorsalibus subalatis, antico et ventrali æqualiter rotundatis, postico vix truncato; totâ superficie, (nisi umbonibus et dorsum versus utroque latere lævibus,) tenue liratâ; liris circ. centum, quoad magnitudinem extantibus, angustis; interstitiis subæqualibus, subquadratis, interdum punctato-decussatis; parte posticâ à lineâ definitâ, lirulis minus conspicuis, laminis concentricis extantibus, crebrioribus eleganter exasperata; intus, dent. card. validioribus, lat. subdistantibus; cic. adduct. ovalibus, haud impressis.

Long. 0·51, lat. 0·48, alt. 0·34.

*Hab.* (*modestum.*) Quelpart Island, China Seas, and Japan; *A. Adams.*

(*Centifilosum.*) Monterey, 20 fms. alive; Santa Barbara 1, Catalina Island, 40 fm. *Cooper.*

Rounder than C. modestum, *Ad. & Rve.*, with fewer and sharper ribs; but the Eastern shells vary, and Mr. Adams considers them conspecific.

### Genus LEPTON, Turton.

### *Lepton meroëum*, Cpr. n. s.

L. t. parvâ, subplanatâ, Meroæ-formi; transversâ, marginibus omnino excurvatis; antice valde productâ; umbonibus acutis, prominentibus; dent. card. (v. sinistr.) uno, celato; lat. ant. prominente, post. subobsoleto; fossâ cartilaginali angusta; cic. adduct. remotis.

Long. 0·11, lat. 0·08, alt. 0·03.

*Hab.* San Diego, 1 broken valve among shell washings. *Cooper.*

### Genus PRISTIPHORA, Cpr.* n. g.

Syn. *Pristes*, Cpr. Rep. Brit. Ass. 1864, (pre-occupied.)

Testa "*Tellimyæ Adamsiorum*" similis; dentibus cardinalibus nullis; lateralibus utrâque valvâ conspicuis, postice elongatis, antice curtioribus, cardinem versus transversim sulcatis; fossâ cartilaginali inter eos sitâ.

### *Pristiphora oblonga*, Cpr. n. s.

P. t. oblongâ, parvâ, subquadratâ, valde inæquilaterali; parte anticâ fere nullâ; marginibus, dorsalibus subrectis, fere rectangulatis, ventrali parum excurvato, postico rotundato; umbonibus antice flectis; lunulâ parvâ, concavâ: intus, v. sinistr., dent. lat. post. per totam longitudinem dorsalem decurrente, parte cardinali acutâ, alte transversim sulcatâ; ant. secundum lunulam incurvato curto, serrato; cicatr. adduct. sub fines dentium sitis.

Long. 0·14, lat. 0·10, alt. 0·06.

*Hab.* San Diego; 1 worn valve among shell washings. *Cooper.*

### Genus LEDA, Schumacher.

### *Leda hamata*, Cpr. n. s. State Collection, No. 984.

L. t. "*L. caudatæ*" simili, sed valde hamatâ; planatâ, valde inæquilaterali; umbonibus angustioribus, lævibus, ad trientem sitis; marginibus, dors. post. maxime incurvato, ant. parum, ventr. valde excurvatis; parte posticâ valde rostratâ, rostro biangulato, curvato, angustiore, biangulatâ; sulcis et costis validis, concentricis, supra rostrum continuis, dorsum versus postice obsoletis.

Long. 0·37, lat. 0·10, alt. 0·10.

---

* From the Greek for *a sawyer;* from the serration of the teeth, which is unique in the family.

### Genus Acanthochites, Risso ? (Leach, 1826).

*Acanthochites avicula*, Cpr. n. s. State Collection, No. 1072.

A. t. "*A. arragonitei*" formâ magnitudine, pallio, et indole simillimâ; sed sculpturâ et laminis terminalibus diversâ; jugo longitudinaliter sulculis circ. vi. instructis, interstitiis quasi planato-squamosis, umbonibus latis; areis diagonalibus haud definitis; lateribus, squamis (quoad magnitudinem) maximis, planatis, ovalibus ornatis, seriebus indistinctis divergentibus instructis; mucrone parvo, antice sito; colore livido et olivaceo-fusco varie tincto; laminis insertionis valv. lat. ut in *A. arragonite;* anticâ, fissuris v.

Long. 0·16, lat. 0·10.

*Hab.* Catalina Island, 10-20 fm., rare; *Cooper.*

### Genus Acanthopleura, Guilding.

*Acanthopleura fluxa, Cpr.* ? n. s.

A. t. "*A. scabræ*" simili, sed latiore, pallidiore; viridi, rubro-aurantio conspersâ; valvis rectangulatis; suturis marginalibus haud conspicuis; areis diagonalibus satis distinctis; radiis obtusis fluxis ii., alterâ diagonali, alterâ suturali; totâ superficie conspicue granulosâ, granulis acutioribus præsertim albidis; jugo obtuso, vix vallato: laminis insertionis ut in A. scabrâ instructis.

Long. 0·60, lat. 0·40, div. 110°.

*Hab.* Santa Barbara Island, *Cooper.*

Foot, in the only dried specimen seen, extremely thin, flat, and narrow.

### Genus Ischnochiton, Gray.

*Ischnochiton veredentiens*, Cpr. n. s. State Collection, No. 518 *a* (bis),

I. t. parvâ, albidâ, rosaceo tinctâ; valvis gothice arcuatis, jugo subacuto; totâ superficie minute granulosâ; areis lateralibus conspicue definitis, minoribus, costis diagonali et suturali validis instructis, bullis valde expressis munitis; valv. term. costulis subobsoletis radiantibus; areis centralibus clathris longitudinalibus utroque latere circ. viii. distantibus, expressis, subgranulosis, supra jugum obsoletis; interstitiis à costulis subradiantibus decussatis; umbonibus conspicuis; marginibus umbonalibus à costis bulliferis valde indentatis, dentibus viii.–x. jugum versus obsoletis, marginibus haud intortis; mucrone submediano, vix extante; marginibus lobatis eleganter à clathris pectinatis: intus, sinu maximo, planato, interdum serrato; laminis insertionis acutis, late unifissatis, valv. term. circ. viii-fissatis, subgrundis conspicuis; limbo pallii squamis majoribus, planatis, tenuibus, vix striatis.

Long. 0·25, lat. 0·10, div. 90°.

*Hab.* Catalina Island, 20-30 fm., *Cooper.*

### Subgenus Lepidopleurus, Risso.

Isch. squamis magnis, ut in Chitone (*Lophyro*) instructis, striatis.

*Lepidopleurus pectinatus*, Cpr. n. s. State Collection, No. 1073.

L. t. "*L. Mertensii*" simili, sed omnino olivaceo; areis diagonalibus radiis plerumque iv. dense tuberculiferis, radioque altero suturali tuberculis inflexis, margines valvarum pectinantibus; costis transversis crebris validis; costulis longitudinalibus acutis distantibus superantibus, quarum margines suturas anticas pectinant; valv. term. ut in areis diag. sculptis, seriebus tuberculorum creberrimis; totâ superficie minutissime tuberculatâ: intus, valvis centralibus unifissatis, terminalibus xi.-xv.-fissatis: scalis pallii irregularibus, confertis, minutissime longitudinaliter striatis.

Long. 0·85, lat. 0·50, div. 110°.

Variat: interdum aurantio nebulosâ.

*Hab.* Catalina Island, Santa Barbara Island, beach, *Cooper.*

*Lepidopleurus scabricostatus,* Cpr. n. s. State Collection, No. 1071 c.

L. t. parvâ, aurantiâ, elevatâ; valvis gothice arcuatis, jugo acuto; totâ superficie conspicue et creberrime granulata: areis lateralibus majoribus, conspicue definitis; seriebus granulorum majorum iii. radiantibus, subobsoletis; umbonibus haud conspicuis; marginibus umbonalibus colore intensiore pseudodentatis, parum intortis; areis centralibus seriebus costularum angustarum subobsoletarum longitudinalibus, valde distantibus, granulis majoribus instructis; valv. term., costulis granulosis similibus radiantibus; mucrone vix mediano, parum conspicuo: intus, lobis suturalibus separatis, sinu maximo, planato; laminis insertionis lat. unifissatis, term. x.-xii.-fissatis, subobtusis; subgrundis modicis. subconspicuis: limbo pallii latiore, squamis imbricatis, elongatis, transversim striatis, crebris ornatâ.

Long. 0·30; lat. 0·17; div. 100°.

*Hab.* Catalina Island; 10-20 fm., *Cooper.*

### Subgenus TRACHYDERMON,[*] Cpr.

Ischnochiton: squamis pallii minimis, confertis.

*Trachydermon Gothicus,* Cpr. n. s. State Collection, 518*a.*

Tr. t. parvâ valde elevatâ, viridi, rosaceo et olivaceo eleganter tinctâ; valvis gothice arcuatis, jugo acuto; areis lateralibus parvis, arcuatim distincte definitis, granulosis; umbonibus prominentibus; marginibus umbonalibus colore tessellatis, intortis; areis centralibus longitudinaliter costatis, costis rotundatis, crebris, haud valde expressis, interstitiis parvis, vix interdum decussatis; valv. term. ut in ar. lat. sculptis, posticâ mucrone mediano, subelevato: intus, lobis suturalibus haud separatis, medio latissime sinuatis; laminis insertionis, lat. unifissatis, term. viii.–x.–fissatis, obtusis, subgrundis haud elevatis: limbo pallii minutissime squamuloso, granulis confertissimis, subrotundatis, lævibus; circa marginem pilulis suberectis.

Long. 0·20, lat. 0·10; div. 80°.

*Hab.* Catalina Island, 8-20 fm., *Cooper.*

### Genus LEPTOCHITON, Gray.

*Leptochiton nexus,* Cpr. n. s. State Collection, 1071*a.*

L. t. parvâ, albocinereâ, valvice gothis arcuatis; areis lateralibus vix definitis; totâ superficie squamulis subquadratis seriatim ornata; seriebus ar. centr. longitudinalibus, ar. lat. et valv. term. radiantibus, creberrimis, haud interruptis; jugo elevato, sub-acuto; umbonibus inconspicuis; marginibus umbonalibus vix inflectis, lateralibus vix à squamulis serrulatis; mucrone conspicuo, mediano: intus, laminis centralibus valde lobatis, sinu maximo, planato; lam. insertionis obsoletis: pallio, squamulis paleatis, striatis, confertis instructo; pilis elatioribus aciculinis, crystallinis, huc et illuc et circa marginem ornato.

---

[*] From the Greek for *rough skin.*

Long. 0·30, lat. 0·18; div. 90°.

*Hab.* Catalina Island, 10-20 fm., *Cooper*.

The appearance of this northern genus among the Mopaliæ and Ischnochitons is very remarkable; as is the character of the mantle-margin.

### Genus NACELLA, Schumacher.

*Nacella* (*? palleacea, var.*) *triangularis*, Cpr. State Coll. No. 416*c*.

N. t. "*N. palleacea*" simili, sed multo minus elongatâ; apice elato, marginibus rectangulatim divergentibus; albidâ, maculis fuscis perpaucis ornatâ; striulis subobsoletis.

Long. 0·28, lat. 0·12, alt. 0·18, div. 90°.

*Hab.* Monterey, 4 dredged dead, *Cooper*.

Probably a distinct species. The solitary shell sent by Dr. Cooper is shaped like a right-angled triangle, with five large brown spots near the base.

*? Nacella subspiralis*, Cpr. ? n. s. State Collection, 416*b*.

? N. t. parvâ, carneâ, lævi, tenuissimâ; vertice "*Emarginulæ*" simulante, subspirali, sed apice patelloideo, adunco; t. adultâ valde elevatâ; margine laterali antico subrecto, apice projiciente, valde remoto; postico maxime fornicato; aperturæ margine antice et postice prolongato.

Long. 0.26, lat. 0·19, alt. 0·20, div. 80°.

*Hab.* Catalina Island, 10-20, fm., 4 dead, *Cooper*.

This may be the young of the long-lost *Patella calyptra*, Mart. It may be a *Scutellina*. Even the genus cannot be predicated from the shell alone.

### Genus ACMÆA, Eschholtz.

*Acmæa* (*? pileolus, var.*) *rosacea*, Cpr.

A. t. parvâ, conicâ, tenui, lævi; t. jun. pallide rosaceâ, elegantissime maculis albis et fuscis subradiatim sparsis; t. adulta strigis fusco-rosaceis et albidis pictâ; apice elevato, parum antico; intus rosaceo.

Long. 0·20, lat. 0.16, alt. 0·08, div. 100°.

*Hab.* San Diego, 1 sp. jun. (*Palmer*): Monterey, 1 dead sp. *Cooper*.

The absence of striæ, very thin texture, and regularly conical growth, distinguish this shell from *A. patina*, a rare variety of which has a pinkish tinge. Specimens in Mus. Cuming are marked "*pileolus*, Midd.," but do not accord with the diagnosis. It is almost exactly like Herm* specimens of *A. virginea*. Col. Jewett's similar shells, marked "Panama," were perhaps West Indian.

---

* A small island in the British Channel.

### Genus SCURRIA (?), Gray.

*Scurria (?) funiculata*, Cpr. (?) n. s. State Collection, No. 466*d*.

? Sc. t. parvâ, albidâ, regulariter conicâ, apice acuto, elevato, parum antrorsum sito; liris validis, rotundatis, interdum vix nodulosis, irregulariter, huc et illuc duplo vel tripliciter dispositis; margine à costis extus undato; cicatrice haud conspicuo.

Long. 0·50, lat. 0·38, alt. 0.26, div. 80°.

*Hab.* Monterey, 6 dredged dead, *Cooper*.

So different from the most strongly marked young specimens of *Sc. mitra* that I presume it to be distinct. The genus depends on the animal, which has not yet been seen.

### Genus PUNCTURELLA, Lowe.

*Puncturella Cooperi*, Cpr. n. s. State Collection No. 1029.

P. t. "*P. galeatæ*," fere exacte simulante; sed laminâ internâ solidâ, planatâ, haud antice sinuatâ, haud suffultâ.

Long. 0·30, lat. 0·21, alt. 0·24, div. 70°.

*Hab.* Catalina Island, not rare, 40 to 20 fms., *Cooper*, alive.

Outside like *P. noachina;* but with the lamina like *P. cucullata*, without eyeholes. The latter species is extremely variable in sculpture, but never so fine as this; and the shape is less conical.

### Genus GIBBULA, Leach.

*Gibbula optabilis*, Cpr. n. s.

G. t. parvâ, pulcherrimâ, subconicâ; lurida, fusco-purpureo maculatâ; anfr. v. subquadratis, suturis distinctis; carinis principalibus in spirâ ii., aliâ intercalante; carinâ fortiori peripheriali, et lirulis circ. vi. basalibus, regulariter colore punctatis; lirâ posticâ subobsolete suturam attingente; aliis minoribus intercalantibus; interstitiis ubique tenerrime et creberrime decussatis; basi subtumente, ad carinam peripherialem fere rectangulato; aperturâ subquadratâ, columellâ parum arcuata; umbilico magno, infundibuliformi, angulato; liris ii. intus spiraliter ascendentibus.

Long. 0·19, long. spir. 0·10, lat. 0·19, div. 80°.

*Hab.* San Pedro, *Palmer*, one specimen.

### Genus CALLIOSTOMA, Swainson.

The names *Calliostoma* and *Ziziphinus* having been published in the same year, I have no hesitation in preferring the generic to the specific.

*Calliostoma supragranosum*, Cpr. n. s.

C. t. parvâ; anfr. v. tumentibus; liris acutis cincta, quarum mediæ læves, posticæ granosæ, basales ix. minores.

*Hab.* San Diego; Cooper.

The single specimen sent differs as above from the young of the next species.

*Calliostoma gemmulatum*, Cpr. Br. Assoc. Rep. 1863, pp. 612, 653.

Syn. *C. formosum*, Cpr. Proc. Cal. Ac. 1864, 155 : non Forbes.

While the sheets of the Report were passing through the press, it was found that the name had been preoccupied by Forbes. As it happened the Californian sheet was being printed simultaneously, and there was no time to make the alteration.

### Genus ETHALIA, Adams.

#### *Ethalia supravallata*, Cpr. n. s.

E. t. parvâ, albidâ, nitente, subdiaphanâ, planatâ ; anfr. nucl. ii. et dimidio, lævis, diaphanis ; norm. uno et dimidio, rotundatis ; postice carinâ valde extante, et fossâ concavâ contiguâ suturam tenus, supra spiram vix planatam ascendente ; in medio basis rotundatæ carinâ alterâ plus minusve extante ; inter eas, circa peripheriam, lirulis radiantibus minimis, haud expressis, sub lente vix conspicuis ; regione umbilicari parum concavo ; aperturâ circulari ; labro à carinis angulato ; columellâ, valde callosâ, porrecta ; callositate pyriformi regionem umbilicarem circumambiente.

Long. 0·03, long, spir. 0. (?) lat. 0·45, div. 180°.

*Hab.* San Diego, Cooper, shell-washings.

Typical among the Vitrinelloid *Ethaliæ* described in Maz. Cat., Nos. 310, 318. Remarkable for the small number of turns in the mature shell as compared with the nucleus.

#### *Ethalia var. invallata*, Cpr.

E. t. "*E. supravallatæ*," aliter exacte simili ; sed vallo spirali omnino carente ; basi angulatâ, haud carinatâ.

*Hab.* San Diego, shell-washings, *Cooper.*

These shells would certainly have been regarded as distinct, but for one specimen which began smoothly, yet after a fracture suddenly commenced a (not prominent) keel : an instructive lesson on variations in sculpture.

### Genus GALERUS, Humphreys.

#### *Galerus contortus*, Cpr. n. s. State Collection, No. 369.

G. t. parvâ, tenui, albidâ ; vertice nucleoso planato, extante, minimo, anfr. uno et dimidio planorbi-formibus, apice conspicuo ; dein conoideâ, elevata, solute spirali, suturis impressis ; superficie rudi, laminis incrementi interdum conspicuis ; laminâ internâ.

Long. 0·26, lat. 0·24, alt. 0·15, div. 80°.

*Hab.* Monterey, 20-40 fm ; Santa Barbara, 16-20 fm ; Catalina Island, 30-40 fm. ; *Cooper.*

The vertex stands out like a tiny Planorbis, and is more minute than in any species I have examined.

### Genus CÆCUM, Fleming.

#### *Cæcum crebricinctum*, Cpr. n. s. State Collection, No. 388.

C. (*Anellum*) t., quoad genus, magnâ, tereti, solidiore, rufofusca, interdum radiis intensioribus longitudinalibus ornatâ; annulis gracillimis, creberrimis, rotundatis, haud elevatis circ. lxxx. cinctâ; interstitiis nullis; sculpturâ longitudinali nullâ; aperturâ acutâ, vix contractâ, vix declivi; septo subungulato, submucronato; margine laterali recto; apice acuto, ad angulum circ. 45°, maxime elevato; operculo vix concavo, lirâ spirali elevatâ.

Long. 0·14, lat. 0·04.

*Hab.* San Diego, 8-10 fms., 12; Monterey, 20 fms., 20, some alive; Santa Barbara, 20 fms., 3, *Cooper*.

Has the aspect, but not the sculpture, of an Elephantulum.

### *Cæcum Cooperi*, Cpr. n. s. State Collection, No. 667*a*.

C. (*Anellum*) t. parvâ, satis tereti, albâ; annulis crebris acutioribus, angustis, circ. xxxiv.-xxxviii., interstitiis subconcavis; septo subungulato; apice obtuso, haud elevato, margine laterali recto; aperturâ declivi, parum contracto et postice expanso; operculo?

Long. 0·09, lat. 0·025.

*Hab.* San Diego and Catalina Island, 8-10 fms. 18, *Cooper*.

Known from similar Mazatlan species by the very numerous but separated and somewhat sharp ribs.

## Genus Turritella, Lamarck.

### *Turritella Cooperi*, Cpr. n. s. State Collection, No. 564.

T. t. valde tereti, tenuiore, cinereâ, rufofusco tinctâ; anf. plurimis, angustis, subplanatis, suturis distinctis; liris ii. et striulis crebris spiraliter ornatâ; basi angulatâ; aperturâ subquadratâ; labro valde sinuato.

Long. 1·80, long. spir. 1·50, lat. 0·45.

*Hab.* San Pedro, 60; San Diego, 16 dead on beach; Santa Barbara, 4 dead, in 16-20 fms. *Cooper*.

As I have seen no complete list of the very numerous fossil species of this genus, it appears allowable, rather than risk a synonym, to name this graceful shell after its discoverer.

## Genus ? Mesalia, Gray.

### ? *Mesalia tenuisculpta*, Cpr. n. s. State Collection, No. 666 *a*.

? M. t. tenui, regulariter turritâ, fusco-cinereâ; anfr. nucl. lœvibus, normalibus, apice acuto; norm. viii. rotundatis, suturis impressis; lirulis spiralibus; haud extantibus, plus minusve distantibus, irregularibus cinctâ, quarum anfr. primis duæ anticæ majores; lirulis circa basim rotundatam obtusis, subregularibus; rugulis incrementi irregularibus, interdum decussantibus; aperturâ subrotundatâ, peritremati haud continuâ; labro acuto, postice flexuoso; labio tenui.

Long. 0·28, long. spir. 0·18, lat. 0·10, div. 15°.

*Hab.* S. Diego; 4–6 fms. 15, alive. *Cooper*.

Intermediate in character between *Mesalia* and *Fenella*.

### Genus Isapis, H. & A. Adams.

*Isapis obtusa*, Cpr. n. s. State Collection, No. 682.

I. t. "*I. fenestratæ*" indole simili, sed magis elongatâ, subnitente. pallide rosacea; vertice nucleoso decliviter immerso, celato; anfr. norm. postice subplanatis, suturis obtusis; costis tumentibus rotundatis circ. vii., suturas et umbilicum minorem versus obsoletis, plus minusve extantibus; interstitiis parvis, irregularibus, haud decussatis; peritremati continuo, labro tenui, secundum costas variantes undulato; labio medio calloso.

Long. 0·23, long. spir. 0·09, lat. 0·16, div. 60°.

*Hab.* S. Diego, 10 fm.; Sta. Barbara, 20 fm.; *Cooper.*

The fortunate discovery of some perfect young specimens displays a nucleus so like *Odostomia* that, despite the resemblance of the shell to *Fossarus*, which has a tuberoid nucleus, it most probably belongs to *Pyramidellidæ*.

### Genus Rissoina, D'Orbigny.

*Rissoina interfossa*, Cpr. n. s. State Collection, No. 387, *b*.

R. t. satis magnâ, crassâ, albâ, satis turritâ, conspicue sculptâ; marginibus spiræ rectis, vertice mamillato; anfr. nucl. ?.. [detritis]; norm. vii. tumidis, angulatis, suturis angulatim impressis; carinis spiralibus validis, in spirâ ii.; alterâ posticâ interdum intercalante; anfr. ultimo duabus quoque peripherialibus, quintâ axim circumeunte; costis radiantibus validis, extantibus, circ. xiv., ad suturas contiguis, liris regularibus spiram ascendentibus, ad intersectiones carinarum nodulosis, ad peripheriam continuis; interstitiis quadratis, alte infossatis; aperturâ ovatâ.

Long. 0·26, long. spir. 0·18, lat. 0·10; div. 28°.

*Hab.* Catalina Is. 8–10 fm. 4; San Diego 1; Monterey, (var.) *Cooper.*

### Genus Rissoa, Freminville.

*Rissoa acutelirata*, Cpr. n. s.

R. t. tenui, satis turritâ, rufocincreâ, marginibus spiræ parum excurvatis; anfr. nucl. iii. normalibus lævibus, vertice parum mamillato; norm. iii. subrotundatis, suturis valde impressis; liris radiantibus circ. xviii. acutis, distantibus, ad peripheriam evanidis; lirulis acutis spiralibus distantibus circ. xv., quarum vi. in spirâ monstrantur, liris radiantibus et interstitiis latis, undatis, eleganter superantibus, haud nodulosis; basi rotundatâ, haud umbilicatâ; aperturâ ovatâ, peritremati continuo.

Long. 0·09, long. spir. 0·05, lat. 0·05, div. 35°.

*Hab.* S. Diego; 1 sp. and fragment in shell-washings. *Cooper.*

### Genus Fenella, H. & A. Adams.

*Fenella pupoidea*, Cpr. n. s. State Collection, No. 389.

F. t. *Truncatellæformi*, sed apice haud decollato; colore maxime variante; seu unicolori, albido, cinereo, viridescente, rufofusco, seu splendide rubro; seu varie fusco maculato; anfr. nucl. iii. lævibus, globosis, vertice mamillato; norm.

v. rotundatis, fere æqualibus, plus minusve solutis, suturis subimpressis; totâ superficie tenue spiraliter striatâ; striis in spirâ majoribus, circ. viii. distantibus, minoribus creberrimis intercalantibus; circa basim rotundatam circ. x. majoribus, contiguis, minoribus paucis; aperturâ circulari, peritremati continuo, solido, ad suturam parum callosam appresso; umbilico nullo.

Long. 0·23, long. spir. 0·16, lat. 0·09, div. 12°.

*Hab.* Monterey, 20 fm. 45, dead. *Cooper.*

### Genus AMPHITHALAMUS,* Cpr.

Testa *Rissoidea;* nucleo magno; apertura labio producto, labro subpostice juncto, subito in adultâ contracta.

*Type.* *Amphithalamus inclusus,* Cpr. Br. Assoc. Rep. 1863, p. 656; Ann. Nat. Hist. Jan. 1865.

*Hab.* Santa Barbara, *Jewett;* S. Diego, in shell-washings. *Cooper.*

### ? *Amphithalamus lacunatus,* Cpr. n. s.

? A. t. adolescente "*A. incluso*" simili; nucleo similiter minutissime et confertissime spiraliter et radiatim striulato; sed majore, latiore, anfr. subplanatis; basi late lacunatâ, haud carinatâ; adultâ ?..

Long. 0·06, long. spir. 0·03, lat. 0·03, div. 50°.

*Hab.* San Pedro. *Cooper.*

Two dead specimens in the shell-washings of Dr. Palmer's consignment to the Smithsonian Institute might have been passed over as the young of *Barleeia subtenuis,* but for the possession of exactly the same remarkable nucleus as *A. inclusus.* It is presumed, therefore, that they are congeneric; if so, the adult has not been seen.

### Genus DIALA, H. & A. Adams.

### *Diala acuta,* Cpr. n. s. State Collection, No. 390.

D. t. parvâ, turrito-conicâ, cerinâ, politâ, nitente; anfr. nucl. ii. naticoideis, vertice mamillato, apice indistincto; norm. v., omnino planatis, suturis indistinctis; peripheriâ acute angulatâ, vix carinatâ; basi omnino planatâ; aperturâ subquadratâ; peritremati continuo; labro postice paullum contracto; labio appresso; columellâ antice angulatâ, vix sinuatâ.

Long. 0·15, long. spir. 0·09, lat. 0·07, div. 29°.

*Hab.* Catalina Is. 8–10 fm.; on beach to Monterey. *Cooper.*

### *Diala marmorea,* Cpr. n. s.

D. t. solidâ, exacte conicâ, læviâ, nitente; subdiaphane pallidâ, rufo maculatâ; anfr. nucl. rotundatis, planorbeis, sub-oblique sitis, apice celato; norm. vi. planatis, suturis indistinctis; basi planatâ, sub-angulatâ; aperturâ ovali, peritremati continuo, haud varicoso.

Long. 0·17, long. spir. 0·11, lat. 0·08, div. 31°.

*Hab.* Monterey, S. Pedro; *Cooper.* Lower California, off Haliotis. *Rowell.*

---

* From the Greek for *chamber on both sides.*

The description is written from a single perfect specimen in Mr. Rowell's collection, and some fragments from the shell-washings of Dr. Cooper's.

### Genus STYLIFERINA, A. Adams.

*Styliferina turrita,* Cpr. n. s.

St. t. minimâ, albidâ, solidiore, lævi, turritâ; anfr. nucl. iii. subnaticoideis, apice mamillato; norm. v. planatis, angustis, suturis parum impressis; basi subito rotundatâ, haud umbilicatâ; aperturâ subrotundatâ; labro postice parum contracto.

Long. 0·06, long. spir. 0·04, lat. 0·02, div. 20°.

*Hab.* S. Pedro. *Cooper.*

A single specimen of this tiny shell was found in the shell-washings of Dr. Palmer's consignment. The mouth is unfortunately choked up with a grain of coarse sand which I have not been able to extract.

### Genus ? JEFFREYSIA, Alder.

*? Jeffreysia translucens,* Cpr. n. s.

? J. t. "*Barleeiæ subtenui*" simili, sed tenuiore, tumidiore; corneâ, pallide fulvâ, lævi, nitente, satis diaphanâ; anfr. nucl. normalibus, apice submamillato; norm. iv. subconvexis, suturis distinctis; basi rotundatâ, haud umbilicatâ; aperturâ ovatâ, peritremati vix continuo; labro acuto; labio appresso, regione umbilicari parum calloso.

Long. 0·08, long. spir. 0·045, lat. 0·06, div. 55°.

*Hab.* S. Diego; in shell-washings. *Cooper.*

Only one specimen having been seen, without animal or even operculum, the genus is doubtful. In its slight labial deposit it resembles "*Litiopa*" *dubiosa,* C. B. Adams.

### Genus CYTHNA, A. Adams.

*Cythna albida,* Cpr. n. s.

C. t. minutâ, albidâ, lævi, diaphanâ, latâ; anfr. nucl. normalibus, vertice mamillato; norm. iii. tumidis, rotundatis, rapide augentibus, suturis valde impressis; basi rotundatâ, valde umbilicatâ; umbilico subangulato; aperturâ subrotundatâ; peritremati continuo, acuto, t. adultâ nonnunquam à pariete separato.

Long. 0·03, long. spir. 0·015, lat. 0·025, div. 80°.

*Hab.* S. Pedro; in shell-washings. *Cooper.*

Known from *C. tumens,* Maz. Cat. No. 421, by the non-keeling of the umbilicus.

### Genus CHRYSALLIDA, Cpr.

*Chrysallida pumila,* Cpr. n. s.

Chr. t. minutâ, angustâ, albâ; vert. nucl. subito immerso, dimidium truncationis tegente; marginibus spiræ parum excurvatis; anfr. norm. iv. planatis, suturis vix distinctis; clathris radiantibus rectis, validis, planatis, circ. xx., marginibus spiræ utroque latere parallelis, sæpius attingentibus, circa basim elongatam, rotundatam continuis; interstitiis lirulis acutis distantibus, haud extantibus, circ. x. decussatis, quarum iv. v. in spirâ monstrantur; aperturâ ovali, peritremati vix continuo; plicâ parietem tenus acutâ, haud celatâ, declivi.

Long. 0·06, long. spir. 0·03, lat. 0·025, div. 12°.

*Hab.* S. Pedro. *Cooper.*

One specimen and a few fragments were found in the shell-washings of Dr. Palmer's consignment. Differs from *Chr. ovulum*, in its slender shape and delicate spiral sculpture.

### *Chrysallida cincta*, Cpr. n. s.

Chr. t. satis regulari, albâ, marginibus spiræ vix excurvatis; vert. nucl. parvo, celato, dimidium truncationis vix superante; anfr. norm. iv. parum excurvatis, suturis distinctis; costis spiralibus obtusis circ. x, cinctâ, quarum iv. in spirâ monstrantur; costis iii. posticis radiatim subgranulosis, seriebus circ. xv., marginibus spiræ utrinque parallelis, supra quartam subobsoletis; interstitiis latis, delicatim decussatis; basi satis prolongatâ; columellâ antice valde effusâ; plicâ parvâ, medianâ.

Long. 0·11, long. spir. 0·07, lat. 0·05, div. 35°.

*Hab.* Santa Barbara group of islands. *Cooper.*

The solitary specimen is probably immature. Intermediate between *Chrysallida* proper and *Mumiola.*

## Genus CHEMNITZIA, D'Orbigny.

### *Chemnitzia chocolata*, Cpr. n. s. State Collection, No. 428.

Ch. t. "*C. tridentatæ*" magnitudine et indole simili; sed teretiore, dense castaneâ, fasciis pallidioribus sub epidermide adhærente ornatâ; anfr. primis gracillimis; vert. nucl. anfr. iii, helicoideis, valde decliviter sito, marginibus spiræ rectis, angustis, haud superante; anfr. norm. xii. planatis, primis tumidioribus, suturis impressis; costis circ. xxviii. rotundatis, validis, circa basim prolongatam haud subito evanidis, anfr. ult. sæpe obsoletis; interstitiis haud æquantibus, haud undatis, haud sulcatis; totâ superficie sub lente minutissime et creberrime spiraliter striulatâ; aperturâ ovali, columellâ parum contortâ, labro intus tenui, haud dentato.

Long. 0·55, long. spir. 0·43, lat. 0·13, div. 17°.

*Hab.* S. Pedro, S. Diego, Monterey; rare. *Cooper.*

One specimen, in Dr. Palmer's consignment, is known from *Ch. tridentata* by the very effuse spire, prolonged base, and crowded ribs without waved sculpture between.

### *Chemnitzia subcuspidata*, Cpr. State Collection, No. 670, *a.*

Ch. t. parvâ, minus tereti, cerinâ seu purpureo-fuscâ; anfr. nucl. ii. et dimidio, valde decliviter sitis, marginibus spiræ parum excurvatis superantibus; norm. viii. planatis, suturis excavatis; costis radiantibus circ. xviii. acutis, circa basim prolongatam vix continuis, ad suturas valde elevatis, subcuspidatis; inter-

stitiis latioribus, undulatis; sulcis spiralibus creberrimis, altis, in spirâ circ. x., costas vix secantibus, circa basim impressis; peritremati vix continuo, labio distincto; columellâ vix tortâ.

Long. 0·23, long. spir. 0·16, lat. 0·06, div. 25°.

*Hab.* S. Diego; 25 dredged in shoal water. *Cooper.*

Differs from the figure of *Ch. tenuicula* (which represents a shell with more numerous ribs than the diagnosis) in its more distant ribs with broader interstices; closer and deeper spiral sculpture; impressed sutures; and especially by the elegant murication of the tops of the ribs, with projecting, curved lines between. This is best seen in the young shells, when the ribs are distinct over the base.

### Genus EULIMA, Risso.

*Eulima (? var.) compacta*, Cpr.

Eu. t. "*Eu. micanti,*" jun. simili, sed multo minus tereti; marginibus spiræ parum excurvatis; anfr. nucl. ?.., [detritis], norm. vii.; basi et aperturâ elongatis; labro parum sinuato.

Long. 0.25, long. spir. 0·15, lat. 0·09, div. 22°.

*Hab.* San Pedro; *Cooper.*

A single dead shell was found in Dr. Palmer's consignment.

*Eulima (? var.) rutila*, Cpr.

Eu. t. "*Eu. micanti*" jun. simili, sed magis tereti; valde nitente, rosaceo et livido tinctâ; anfr. nucl. ut in "*Eu. micante;*" norm. x. elongatis, gracillimis; basi et aperturâ valde prolongatis; columellâ magis tortâ; labro valde sinuato, supra suturam retrorsum calloso; labio angusto.

Long. 0·26, long. spir. 0·19, lat. 0·07, div. 20°.

*Hab.* Monterey; *Cooper.*

Closely allied to *Leiostraca producta*, Cpr. Maz. Cat. No. 551, but displays no varices. The Eulimidæ are very difficult to distinguish, from a few shells alone.

### Genus SCALARIA, *Lam.*

*Scalaria bellastriata*, Cpr. n. s. State Collection, No. 393, *b.*

S. t. curtâ tenuissimâ, albidâ; anfr. vii. valde tumentibus, haud nisi per costas attingentibus; costis circ. xvii. acutis extantibus, reflexis, haud semper in spirâ attingentibus, postice angulatis, parum spinosis; interstitiis circa spiram basimque dense spiraliter lirulatis, lirulis rotundatis, super varicum angulum obsoletis; aperturâ ovatâ, umbilico magno.

Long. 0·78, long. spir. 0·55, lat. 0·38; div. 40°.

*Hab.* Monterey, a fragment; San Diego, 1; San Pedro, 3; *Cooper.*

So different in sculpture from *S. pretiosa* and other species with which it agrees in shape, that there will be no difficulty in recognizing perfect specimens.

*Scalaria subcoronata*, Cpr. n. s. State Collection, No. 393, *a.*

S. t. compactâ, haud elevatâ, albâ; anfr. x. rotundatis, parum attingenti-

bus; costis circ. xiii. acutissimis, expansis, vix reflexis, postice attingentibus, lineis margini spiræ dextro parallelis spiram, ascendentibus, t. adolesc. postice vix coronatis, adultâ simplicibus; aperturâ subcirculari, umbilico nullo; sculpturâ spirali nullà.

Long. 0·45, long. spir. 0·29, lat. 0·22, div. 38°.

*Hab.* Monterey; *Cooper.*

Like *S. communis*, jun., but with the upper whorls slightly coronated.

*Scalaria crebricostata*, Cpr. n. s. State Collection, 393.

S. t. gracili, tenui, albâ; anfr. x. rotundatis, haud attingentibus; costis circ. xv., acutis, reflexis, vix attingentibus, lineis irregulariter spiralibus ascendentibus; costis juxta suturam eleganter coronatis; sculpturâ spirali, nisi striulis interdum exillimis, nullâ; aperturâ rotundatâ; umbilico nullo; operculo normali, dense corneo.

Long. 0·70; long. spir. 0·52, lat. 0·18, div. 26°

*Hab.* Monterey, San Pedro, *Cooper*, common.

= "Scalaria, unique" Mus. Cum. No. 32.

Somewhat resembles *S. tenuis*, Sby., but is not so turrited.

Genus OPALIA, H. & A. Adams.

*Opalia spongiosa*, Cpr. n. s.

O. t. turritâ, parvâ, albidâ, marginibus spiræ rectis; anfr. ix. subplanatis, suturis impressis; costis undulantibus circ. xiii., plerumque (nisi ad suturas crenulatas) obsoletis; totà superficie lineis punctorum creberrimis, spiralibus, punctis creberrimis, minutis, altissimis; circa basim imperforatam costa anticâ latissimâ, spirali; aperturâ ovatà, valde callosâ; operculo aurantiaco, paucispirali.

Long. 0·36, long. spir. 0·26, lat. 0·12, div. 20°.

*Hab.* Monterey, *Cooper.* From shell washings.

The solitary specimen has the general aspect of *O. granulosa* on a very small scale.

*Opalia retiporosa*, Cpr. n. s. State Collection, No. 1014.

O. t. "*O. bullatæ*" formâ simulante, sed sculpturâ omnino diversâ; anfr. nucl. ?... (decollatis); norm. vii. subrotundatis, suturis impressis; costis radiantibus rotundatis, subarcuatis, haud varicosis, circ. xiv., super suturas tenue continuis; anfr. ult. seriebus nodulorum spiralibus irregularibus, vice costarum, instructâ, peripheriâ tuberculosâ; totâ superficie retiporosâ, interstitiis alte interpunctatis, punctulis minutissimis, confertissimis; basi vix costatâ, à serie nodulorum angulatâ; aperturâ rotundatâ; peritremati continuo, varicoso; labro haud sinuato; operculo ? paucispirali.

Long. 0·28, long. spir. 0·20; lat. 0·10; div. 20°.

*Hab.* Catalina Island; 3 dead in 40 fm.;" *Cooper.*

The texture has a rotten appearance; yet one of the specimens was stained with purple, and contained the dried remains of the animal, with its operculum. In the endeavor to extract this, the shell gave way.

### Genus Nassa, *Lam.*

*Nassa insculpta*, Cpr. n. s. State Collection, No. 1008.

N. t. satis elevatâ, compactâ, tenuiore, elegantissimâ, marginibus spiræ subrectis; albescente, rufo-carneo varie maculatâ; anfr. nucl. iv. lævibus, normaliter augentibus, apice minuto, satis extante; norm. v. subrotundatis, suturis satis impressis; aperturâ subrotundatâ, canali acute reflexâ; totâ superficie sulculis æquidistantibus, quarum x. anfr. penult. apparent, insculptâ; anfr. norm. ii. primis costulis quoque radiantibus circ. xvi. haud expressis ornatâ; labro rotundato, extus varicoso, intus sulcidentato: labio valde calloso, supra basim seu parietem expanso, haud extante, intus ruguloso.

Long. 0·80, long. spir. 0·43, lat. 0·46, div. 45°.

*Hab.* Catalina Island, 30-40 fm.; 15 mostly alive, but few mature; animal white; *Cooper.*

This singularly beautiful species probably belongs to the section *Zeuxis*, H. & A. Adams. The callus is slightly reflexed in the best specimen.

### Genus Amycla, H. & A. Adams, 1858. (auctum.)

? *Amycla chrysalloidea*, Cpr. n. s. State Collection, No. 613.

? A. t. parvâ, eleganter effusâ, marginibus spiræ utrinque excurvatis; albidâ, rufofusco concinne punctatâ seu tinctâ; interdum strigâ albida subsuturali, rufofusco tesselatâ; anfr. nucl. iii. lævibus, haud tumidis, apice declivi; norm. v., t. adolescente planatis, dein tumidioribus, suturis distinctis; totâ superficie elegantissime tenuiter sulcatâ, sulcis æquidistantibus, anfr. penult. circ. xx.; aperturâ flexuosâ subpyriformi; canali oblique sinistrorsum truncatâ, axi quasi umbilicatâ; labro intus acuto, postice sinuato, deorsum quasi tumidiore, intus vii-dentato; columellâ tortâ; labio antice rugis paucioribus interdum munito.

Long. 0·37, long. spir. 0·22; lat. 0·14; div. 25°.

*Hab.* San Pedro, 1 on beach; San Diego, 30, some alive in 8 fms. on sand, in upper part of bay. *Cooper.*

This is one of the most beautiful, but (without a knowledge of either animal, or operculum) most puzzling of the small shells of California. It has relations with *Euryta*, *Truncaria*, *Metula*, and *Daphnella.*

### Genus Anachis, H. & A. Adams.

*Anachis subturrita*, Cpr. n. s.

A. t. minuta, angusta, Rissoinoideâ, pallide purpureofuscâ, albido maculosâ; anfr. nucl. ? (decollatis); norm. v. subplanatis, suturis distinctis; costulis radiantibus circ. xx. angustis, vix extantibus, parum flexuosis; sculpturâ spirali nullâ; aperturâ quadratâ; labro acuto deorsum tumente, postice sinuato; labio conspicuo; columellâ tortâ, truncatâ.

Long. 0·13, long. spir. 0·09, lat. 0·05, div. 30°.

*Hab.* San Diego, *Cooper.* From shell washings.

The only specimen seen of this tiny species is not quite mature, and has formed no labral teeth.

### Genus TROPHON, Montfort.

*Trophon triangulatus*, Cpr. n. s. State Collection, No. 580, *a*.

T. t. parvâ, tenui, albâ, postice latâ, antice attenuatâ ; anfr. nucl. ii. minutis, lævibus, attenuatis, vertice declivi, celato ; norm. (t. adolescente) iv. subtriangulatis, postice tabulatis, axi fere rectangulatis ; suturis acute impressis ; antice rapidissime angustatis, canali longâ, arcuatâ ; varicibus circ. vii. laminalis, acutis, ad angulum in spinam apertam compressis, spinis radiantibus, parum superne arcuatis ; lineâ seu angulo obsoleto peripheriali, suturam continuante ; aperturâ pyriformi ; labro antice haud indentato.

Long. 0·35, long. spir. 0·15, lat. 0·15, div. 70°.

*Hab.* Catalina Island, 60 fm.; 4 alive, of equal size, *Cooper*.

Resembles the young of *Murex centrifuga*, Hds., and is related to *Trophon muricatus*, Hds.

Besides the above species, which were entirely new to science, the fresh and perfect specimens collected by Dr. Cooper, on the Survey, from authentic localities have enabled me to make out and complete the diagnoses of many species first found indeed by other naturalists, but in such poor condition, or with such uncertainty of habitat, that it would have been unsafe to have ventured on their description.

---

## REGULAR MEETING, SEPTEMBER, 18th, 1865.

President in the chair.

Seven members present.

Mr. P. M. Randall was elected a resident member.

Donation to the Cabinet: Specimen of *Aplodontia leporina*, shot near Lake Tahoe, by Mr. J. M. M'Donald.

---

## REGULAR MEETING, OCTOBER, 2d, 1865.

Mr. Fisk in the chair.

Seven members present.

Donations to the Library: Proceedings of the Royal Horticultural Society, Vol. IV, No. 12—Correspondenzblatt des Naturf. Vereins zu Riga, 14$^{te}$ Jahrgang. Mittheilungen aus dem Osterlande

1 Sept. 1–4, 1860–1864; Kongliga Svenska Vetenskaps-Akademiens Handlingar, 1862; Ofversigt of K. V. Ak. Förhandlingar, 1–10, 1863; Meteorologiska Iaktagelser, 1862; Memoires de l' Academie Imperiale des Sciences de St. Petersbourg, Tome V, Nos. 2–9; VI; 1–12. Bulletin de l' Academie de St. Petersbourg, Tome V, 3–8; VI, 1–5; VII, 1–2; Verhandlingen van het Bataviaasch Genootschap, Deel XXIX, 1862. Tijdschrift voor indesche Taal- Land- en Volkenkunde, Deel XI, 4th Serie, Deel III, Afl. 1–6; Sitzungsberichte der K. bay. Ak. der Wissenschaften, zu München, 1863, II, Heft 2–4; 1864, I, Heft 1–4, Supp. 5; 1864, II; Heft 1–2. Annalen der K. Sternwarte bei München, Band XIII, Supplementband, IV. Botanisk Reise of Axel Blytt, 1864. Beretning af G. P. Sars, 1864. Meteorologische Beobachtungen auf Christiania's Observatorium, Lieferung 1–4. Monatsberichte der k. preuss. Ak. der Wissenschaften zu Berlin, 1864. Journal d' Agriculture, 1862. Memoires de l' Academie imp. de Dijon, Ser 2, Tomes 10, 11, 1862, 1863. Société imp. des Sciences Naturelles de Cherbourg, Tomes IX, X.

The above-named volumes were presented by the different societies named, through the Smithsonian Institution.

Mr. Stearns anounced that *Helix infumata* had been found as far south as Cape Mendocino.

## REGULAR MEETING, OCTOBER 16th, 1865.

President in the chair.

Five members present.

The following paper was presented by Mr. Bolander.

### **Remarks on California Trees.**

BY HENRY N. BOLANDER.

NOTE.—Localities given with two !! I have not visited myself. I would also further remark that I am by no means sure of having correctly determined the two oaks—*Quercus Douglasii* and *Garryana.*

It may not be altogether amiss to offer some observations on the distribution and value, as specimens, of some of our trees which I have met with on my various trips over a portion of this State.

1. *Pinus Sabiniana*, Dougl. (Digger Pine.)

Invariably disposed over south-hillsides of the interior, occupying the driest expositions—Mount Diablo! Russian River Valley! Geysers! Auburn and Forest Hill! San José Valley! Near Mission San Antonio!! Mountains east of San Diego!!

As to its value there are a great many contradictory assertions made by farmers; some assert it yields an excellent wood for yokes and similar objects, while others denounce it as entirely useless.

2. *Pinus Lambertiana*, Dougl. (Sugar Pine.)

Pine Mountains near Geysers! Near Cloverdale! Forest Hill! Mountains east of San Diego!! Generally with *Pinus ponderosa* in groves, occupying the damper localities.

3. *Pinus ponderosa*, Dougl. (Yellow Pine.)

Russian River Valley! south of Clear Lake! Geysers! Auburn and Forest Hill! San José Valley! Blue Mountains!! (Mr. Dunn) Rocky Mountains!! New Mexico!!

4. *Pinus insignis*. Dougl. (Monterey Pine.)

Monterey! Carmelo Valley!

This species covers many thousand acres of land near and by Monterey and Carmelo, forming quite an extensive forest along the coast between these two places. Height, sixty to one hundred feet, and one to three feet diameter; outline very irregular, consisting often of only a few rigid spreading branches; foliage dense and of a vivid green color; cones persistent, often from ten to nineteen whorls; bark very thick and rimose. Wood extremely resinous and rather coarse-grained; excellent for street planks, bridges, and floors. At present it is no more in the market as lumber; the good timber has been all cut, and the saw-mill removed.

Considering that there is, besides this species, only *Pinus muricata* growing in that forest, which could not be confounded with the species in question—it is certainly most singular to meet with so many synonyms for it. *Pinus radiata*, Don.; *Pinus Sinclairii* and *Pinus tuberculata*, provided this last should not prove to be a good species. It is the more astonishing since trees and cones are of great conformity throughout the entire forest.

5. *Pinus tuberculata*, Don.

Santa Cruz! Ukiah! Oakland hills! Forest Hill! Eureka!!

In all these localities, it is a small tree, from twenty to thirty feet high, and from six to fourteen inches in diameter. It retains its lowest branches, which spread generally very much, often horizontally. The foliage seems to me less dense and less vivid-green, than that of the preceding. Young trees raised here, side by side, show the same differential characters. The cones from all these different localities are very uniform, and differ essentially from those of *Pinus insignis* at Monterey. The seeds, however, resemble each other very much. Both species grow near the coast, but on different soil. *Pinus insignis*, on a soil produced by the disintegration of a bituminous slate and granite; *Pinus tuberculata*, in all the above-mentioned localities, on a soil derived from metamorphosed sandstone. Should these two species be definitely united, after a thorough investigation, they would afford a most striking example of the influence of a different soil. It is certainly singular to find such a well-characterized form restricted to one locality only. This fact, however, would not stand isolated with us here; *Abies bracteata*, we find similarly confined to one locality only in California. Isolation is more or less a characteristic feature with all our trees, and there is probably no country where the influences of soil, climate, and exposition are so well and abruptly marked and unmistakably defined.

6. *Pinus muricata*, Don.

Monterey! Mendocino City!

In a moist depression at Monterey, I found a small group of this species, averaging about fifteen feet in height, and five to six inches in diameter. Bark reddish and nearly smooth; branches almost at a right angle with the main axis and generally from five to seven in a whorl; leaves of a darker vivid green, and more succulent and longer, than those of *Pinus insignis*, of which there were trees of the same size by the side of it; cones from three to seven, in a whorl very much aggregated and clustered. I counted seventeen whorls on a tree fifteen feet high. The lower portion of the trunk was clad with dead leaves.

At the same distance (about two miles) from the ocean, and scarcely a mile from the above-mentioned depression, I found another group (mixed with *Cupressus macrocarpa*) in a deeper but drier locality. Here the tree was altogether of a different aspect, inferior in all its parts. This very transition suggested strongly, that this pine and the one previously seen on the plains near Mendocino City, on a similar soil, might be of the same species.

Near Mendocino City, on the so-called plains, I found in great abundance a small pine tree, which I refer for the present to this species.

Height, five to twenty feet, but the greater number averaged only from five to fifteen feet. Only one tree which I noticed which was fifty-five inches in circumference, and twenty to twenty-five feet in height. It had a flattish top with the branches very much imbricated and so completely covered with cones, that it was really difficult to discover its foliage. But this tree was very exceptional, compared with the mass of little trees covering the plains. These had in general upright branches with numerous and slender branchlets; leaves shorter, denser, and of a darker green than *Pinus contorta?* which grows with it and is a larger tree altogether; bark reddish, very thin, exhaling a strong resinous odor, and but slightly rimose; cones two to four inches long (curved when long) and scarcely an inch thick, mostly in pairs, but sometimes in threes, reflexed. I counted fifteen sets of cones on a tree fifteen feet high.

7. *Pinus contorta*, Dougl.?

Head of Tomales Bay! Mendocino City!

Its manner of growth resembles that of *Pinus insignis* very much. It attains the same height, has the same irregular spreading branches, the same thick rimose bark and very resinous wood. The leaves are invariably in pairs and slightly silvery on the lower surface. The cones are scarcely two inches long with mostly reflex pedicles (umbo) on the slightly gibbous side and persistent for a great number of years.

From the River Albin to Mendocino City, it grows quite near the coast on a fertile and undulating plain, gently descending towards the ocean. At Mendocino City I found it to extend all over the plains about eight miles eastward.

Whether this species is identical with *Pinus contorta* or not I am unable to decide. Observations made by Mr. Geo. Wm. Dunn, on his recent travels through the Blue and Siskiyou mountains, have rather a tendency to show that *Pinus contorta* is altogether a different tree. I can state, however, most positively that this species cannot be confounded with *Pinus muricata.* Both species are two-leaved, but in every other respect they differ widely. The object of these remarks is only to point out the different species, met in my travels, and not to decide which name should have precedence. Murray's discussion on the distribution of our Pines, in his "Notes on California Trees," has not "struck" me as being so very correct. Endlicher, in his Synopsis Coniferarum, makes *Pinus muricata* a Taeda, which is also incorrect; it is a true Pinaster. It remains to decide only, whether the species at Mendocino City is *P. contorta*, or *P. Murrayana*, Balf.

8. *Libocedrus decurrens*, Torr. (California White Cedar.) Forest Hill! (forming quite a large woods there). Rancheria Creek! Mendocino County. East of Salinas River, Monterey County. Dr. Canfield. East of San Diego!!

On the banks of Rancheria Creek, in the south-western part of Mendocino County, I found a small colony of this handsome tree. The largest were about forty to sixty feet high and two to three feet in diameter. Judging from the young after-growth, the tree seems likely to spread. I was informed that this is the only place in the county where it is to be found. In the latter part of September (1865) the tree had its aments strongly developed. Cones decidedly pendulous.

9. *Cupressus macrocarpa*, Hartw. (Monterey Cypress.) Monterey! Tamal Pais (2,700 feet)! Mendocino City! and south-east of Clear Lake!

This species seems to be extremely variable. At Monterey, about two miles from the coast, I saw, upon exposed granite rocks, but slightly disintegrated, specimens only six inches high, bearing perfect cones. Going westward, at the same distance from the ocean, I found specimens in a depression associated with *Pinus muricata*, from ten to fifteen feet high, full with cones; and extending my walk to Cypress Point, a distance of three to four miles, I was surprised to find a large grove of this species, containing mostly large trees of great beauty and perfection. The average height may be from forty to sixty feet, and as they were (right at the point) almost all alike in thickness, I measured but three, finding their circumference to be one hundred and nineteen, one hundred and four, and one hundred and twenty inches, about four feet above the ground. At this point these trees are almost daily enveloped in a dense fog. Their branches are very densely imbricated and depressed, retaining the moisture to such an extent that the thick clusters of cones are quite mouldy. Between the cones and little dense branchlets settles a great deal of rubbish, which is almost dripping wet. It is undoubtedly owing to this very fact that so many seeds of this species, collected there, prove abortive.

Seeing so great a variation at Monterey, I do not hesitate to refer all specimens, seen at the other localities mentioned above, to this species at present.

On the plain near Mendocino City, that species exhibited about the same gradations, although not so strikingly as at Monterey.

10. *Torreya Californica*, Torr. (California Nutmeg.) Paper Mill! Marin County. Ukiah! Mendocino City! Forest Hill!

Generally dispersed, only at Ukiah I found quite a group of this species. Wood valuable.

11. *Taxus brevifolia*, Nutt. (California Yew-Tree.) Devil's Cañon, near Forest Hill! A handsome tree, twenty to thirty feet high, with extremely slender and drooping branches. Dispersed but plenty.

Wood valuable.

12. *Quercus agrifolia*, Nées. (Live Oak.) Oakland! Banks of Sacramento River! Clear Lake! Russian River Valley! Anderson Valley! Monterey!

Foliage extremely variable. On river banks and in expositions close to the coast, where it is almost daily enveloped in fogs, this species exhibits quite a uniformity; the figure of *Quercus oxyadenia* in Sitgreaves' Report represents this form of it very well. In the valleys of the interior the shape of the leaves of one and the same tree is very different. Some have entire margins, while others have them pretty deeply dentated, often one side is entire and the other dentate. Some trees occur of which the young shoots have the leaves "coarsely sinuate-toothed, or obliquely sinuate-toothed; teeth very sharply acute with a broad base, cuspidate-awned," and thus agree with Dr. Kellogg's *Quercus Morehus*—while the older branches have much smaller and entire leaves. In Anderson Valley I saw several trees whose entire foliage agrees admirably with Dr. Kellogg's. Had I not seen that tree on the shore of Borax Lake exhibiting both forms, I should be inclined to call it a good species. The cups of the acorns of these trees have the scales long and loosely imbricated, and the acorn is almost entirely immerged; but this is also the case with those of some trees that have a far different foliage. Thus far I have not been able to find good, distinctive, reliable characters. There are transitions in all parts, even on the same tree. As the tree has the habit of growing in groups, one might suppose that trees of one group, at least, should show a uniformity in botanical characters; this is not so; just the very extremes may be found in one and the same group. This phenomenon I observed throughout the whole length of Anderson Valley, a distance of some eighteen miles. On dry gravelly hillsides in the interior this tree presents still another form: *Quercus Wislizeni*, Englm.

The acorns ripen annually and differ also essentially in shape and size. Soil, climate, and exposition, offer in this case no satisfactory explanation for so great a variation in one species. Should it not be attributed to intrinsic peculiarities?

13. *Quercus Garryana*, Hook. (White Oak.) On dry easterly hillsides and in valleys on a poor buff-colored clay. Santa Rosa Valley! Clear Lake! Searsville! Anderson Valley! San José Valley!

Exposition and soil agree in all these localities.

The bark of this tree is rather thin, whitish, and less coarsely rimose than any other of the Californian oaks. It is always a flat-topped, middle-sized tree, apparently of a very slow, almost stunted, growth. The whitish bark of trunk and branches, the glaucous foliage, and the light-green color of the acorns, which it yields, however, quite sparingly, give this tree, compared with other oaks especially, quite a pale and hoary appearance.

Farmers consider the fine-grained wood of this oak very valuable for many farming implements. It ranks highest among our oaks.

14. *Quercus Douglasii*, Hook. (Pale Oak.) Anderson Valley!

The general aspect and habit of this tree resembles very much that of *Quercus lobata*, with which it grows in the low, flat portions of Anderson Valley. Its branchlets, however, are short, rigid, and erect, while those of *Qu. lobata* are mostly drooping. In fall, when laden with acorns, it presents a very striking difference by having its rather pale acorns densely aggregated and clustered at the extremities of the branchlets, resting, as it were, on the dark-green leaves. At a distance it may be mistaken for a full-bearing apple tree. It increases rapidly in number in Anderson Valley from south to north, outnumbering almost every other oak at the lower end of the valley. Its wood ranks next to that of *Quercus Douglasii.*

15. *Quercus lobata*, Nées. (Burr-Oak.)

The most common and largest oak in all the valleys of the interior of California. Thus far, I never found it on a hillside. It is this mighty oak, with its peculiar, gracefully-drooping branchlets, that gives character to the landscape of the Californian valleys. It is especially noted for its very long acorns; but they do not always attain that large size, and are never so conspicuously arranged as those of *Qu. Garryana;* they are usually in pairs. It may also be stated that this tree forms, on an average, about the longest trunk of Californian foliaceous trees. The acorns of this species form a principal part of the food of the Indians. On the Coast Range they seem to give, however, preference to those of *Quercus Sonomensis.* The wood ranks next to that of the preceding species.

These above-mentioned three species of oaks, belonging to the section of white oaks, are surely distinct. I met with no transitions thus far. They may be distinguished at a distance; every farmer distinguishes them, for there is quite a difference in the quality of the wood.

16. *Quercus Sonomensis*, Benth. (Black Oak.) San Diego!! Anderson Valley! Auburn!

Eastern and northern hillsides in the Coast Ranges. It also occupies the more easterly-situated flats, among the redwoods, wherever they are too dry for redwood. Very seldom it is found in the valley; and when found, it occupies that portion of it which is adjacent to the hillsides, where there is generally a gravelly soil. It is always a middle-sized tree, having mostly numerous erect branches arranged like those of *Acer saccharinum.* In fall it sheds its leaves, which become buff-colored, before any other of our deciduous oaks. The wood of this tree is of a poor quality; used for fuel only.

17. *Quercus chrysolepis*, Liebm. (Drooping Live Oak.)

The most rare of all our oaks; it bears acorns but seldom, and even then very sparingly. I have not been able to satisfy myself whether they are biannual or not, but I am rather inclined to believe they are. Northern slopes near Cloverdale! in Anderson Valley! and near Forest Hill! Tree 30–40 feet high, with a rather smooth whitish bark, and mostly long, slender, drooping branches; evergreen. Of the quality of its wood I could not learn anything from settlers. The tree being rare, and occupying always moist slopes along gulches, it is not often cut down.

18. *Quercus densiflora*, Hook. (Chestnut Oak.)

Along the Coast Range, associated with the redwood, increasing northwards; from Santa Cruz to Mendocino City, at least, it occurs only in or close by the redwoods. This tree attains rather a large height in dense woods, and is then but sparingly branched. Leaves and acorns very considerable. Its wood is absolutely useless; it is very coarse grained, and like the redwood wet like a sponge when cut; it is extremely perishable. At Mendocino City log-men call it Water Oak.

19. *Castanea chrysophylla*, Dougl. (Chestnut.)

On the Oakland hills this species is but 3–6 feet high; blooms about the fourth of July, like the Eastern *Castanea vesca*, and bears perfect fruit. On the so-called plains at Mendocino City, however, it is a large tree, averaging from 50–125 feet in height, and 2–3 feet in diameter. Those trees were completely covered with blossoms on the twenty-third of September, 1865; settlers say they never found its fruit. Here, on the Oakland hills, it grows only on the outcropping of a white friable slate, destitute of all vegetable remains; at the Mendocino plains it is found to grow on a cemented gravel, upon which the water rests for some months after the rainy season. The supply of an aerial moisture during the dry season is in favor of the Oakland hills, judging by the lichenose vegetation of the two localities.

20. *Sequoia sempervirens*, Endl. (Redwood.)

This mighty tree belongs exclusively to the foggy regions of the Coast Ranges and the underlying metamorphic sandstone, for wherever either of these conditions is wanting, this tree does not exist. From the northern boundary line of the State down to the head of Tomales Bay it forms a continual forest, increasing in width northward. At Tomales Bay the chain is interrupted by a small bed of lime-rock. The interruption extending from the lower foot-hills of Tamalpais down to Belmont, is undoubtedly owing to the lowness of the hills. A connecting link is found, however, on the Oakland hills. That grove of redwoods, now almost entirely destroyed, affords the strongest evidences of the dependency of that species on the prevalence of heavy mists. From Belmont to a few miles below Santa Cruz is another narrow continuous chain, occupying mainly the leesides of the most western ranges and the deeper gulches eastward. From near the mouth of Salinas River to the head of Carmelo Valley, another long interruption is caused by a bituminous slate. The absence of redwood in this long interval can hardly be ascribed to any other cause, for it is known that Monterey and the adjacent regions are subject to heavier fogs than Santa Cruz. *Pinus insignis* and *Cupressus macrocarpa* occupy here those portions naturally belonging to the redwood and *Tsuga Douglasii.* Further south, from the head of Carmelo Valley to San Luis Obispo, the most southern limit, redwood occurs but sparingly, forming nowhere extensive groves. Associated with the redwood we find *Tsuga Douglasii*, a tree of a wide range, *Torreya Californica, Arbutus Menziesii, Quercus densiflora*, and in Mendocino County *Abies grandis* Dougl. There are also some shrubs and herbaceous plants truly characteristic to them, the shrubs increasing as underwood northward, belong mostly to the Ericaceous family. It is a noteworthy fact that the arborescent growth of the leeside of the first range of hills generally consists, almost exclusively, of *Tsuga Douglasii*, and that this tree forms the outskirt east and particularly westward. In Mendocino County *Abies grandis* unites with it for the same cause; there both trees form a dense belt, facing the ocean. and are encroaching fast on the redwood. In fact, the western portion of those redwoods show this encroachment most strikingly by a total absence of young redwood, and a dense, almost impenetrable, undergrowth of the two-mentioned species. The order of things is, however, reversed wherever the redwood has been cut. Its roots are imperishable, and as soon as the tree is cut they sprout and cover the soil rapidly to the exclusion of every other species—none being of so rapid a growth. The indestructibility of the roots prevents the clearing of such land; even large trunks cut down cover themselves, within two or three years, so completely with sprouts that they are hardly seen. The entire after growth now found on the Oakland hills, is owing solely to the indestructibility of its roots and stumps. The tenacity of life in this species, which is rather of rare occurrence in coniferous trees, shows itself also in the resistance it offers to fire, so frequent in those woods. Trees that have been bereft completely of their branches by fire, covered themselves in a few years entirely with young sprouts, giving the trunks the appearance of a pillar, or remind one of those old trunks covered with *Rhus toxicodendron* in the East. Fire is destructive to the young trees only; after they have obtained a thickness of two or three feet they are not liable to perish.

Another great beneficial feature in this species is the great power it possesses in condensing fogs and mists. A heavy fog is always turned into a rain, wetting the soil and supplying springs with water during the dry season. Springs in and near the redwoods are never in want of a good supply of water, and crops on the Coast Ranges are not liable to fail. The year of 1864 has proved my assertion beyond doubt; this fact is generally known — a great deal of land has been taken up since. It is my firm conviction that if the redwoods are destroyed—and they necessarily will be, if not protected by a wise action of our Government—California will become a desert, in the true sense of the word. In their safety depends the future welfare of the State; they are our safeguard. It remains to be seen whether we shall be benefited or not by the horrible experience such countries as Asia Minor, Greece, Spain, and France have made, by having barbarously destroyed their woods and forests. But with us here it is even of a more serious nature; wise governments would be able to replace them in those countries, but no power on earth can restore the woods of California when once completely destroyed!

## REGULAR MEETING, NOVEMBER 6th, 1865.

Dr. Kellogg in the chair.

Eight members present.

Donations to the Cabinet: Specimen of *Pinus ponderosa*, *Abies Douglasii*, *Taxus brevifolia*, *Larix occidentalis*, *Pteris aquilina*, and *Abies Menziesii;* presented by Mr. Dunn.

## REGULAR MEETING, DECEMBER 4th, 1865.

President in the chair.

Seven members present, and Mr. W. H. Dall as a visitor.

Major Edward Preiss and Count Oswald Thun were elected Corresponding Members.

Mr. Bolander made some remarks on a wild California Grape (*Vitis Californica*) growing near Oakland.

Professor Whitney gave an account of the explorations of Professor Pumpelly in Japan and China. An elaborate memoir, by this gentleman, containing a full account of his very important geological discoveries, will appear in the second volume of the Memoirs of the National Academy of Sciences.

Mr. Dall made some observations on the progress of the Russian American Overland Telegraph Expedition, and gave an interesting description of the region which had been traversed by the party.

## REGULAR MEETING, DECEMBER 18th, 1865.

Dr. Kellogg in the chair.

Six members present.

Dr. Ferdinand Stoliczka, Palæontologist to the Geological Survey of India, was elected a Corresponding Member.

Donations to the Cabinet: One box of shells and two of fishes, collected at Tahiti, by Mr. Andrew Garrett.

The following papers were presented.

### Notice of a peculiar Astringent Gum or Coloring Substance in the Cones of the Sequoia gigantea.

BY WILLIAM P. BLAKE.

I am not aware that any notice has yet been taken by scientific chemists of a peculiar substance, apparently a gum, which accompanies the seeds of the great trees, and may be shaken out of the dried cones. About twenty cones yielded me an ounce of the material. It does not adhere to either the seeds or the cone, but appears to have shrunk from both in drying. It falls out in loose broken grains with brilliant conchoidal fractured surfaces, and looks a little like dried blood. The color is purplish-red, nearly black by reflected light, and a brilliant carmine-red by transmitted.

The taste is strongly astringent, and suggests tannin; it is somewhat bitter, and is similar also to that of very strong black tea. It softens and becomes gummy between the teeth. It dissolves completely in water and in ordinary alcohol, giving a brilliant claret-colored solution which gradually darkens by exposure to the air. The addition of carbonate of soda darkens the solution and lime-water turns it black, giving a black scaly precipitate. Dilute sulphuric acid reddens the solution and causes a red precipitate.

It is in many respects similar to the *kino* of the shops, but has a brighter colored powder and streaks. The kino that I have seen has a brownish-red streak; this substance gives a purplish-red.

The reactions with alkalies and acids in respect to color are similar to those of green redwood boards, which may be stained as dark as rosewood by alkalies and red by acids.

This substance may be found to have some peculiar value in pharmacy, or as a coloring matter for tinctures or wine. I hope that this notice wlll induce a thorough investigation of its nature and properties. If it proves to be new, I suggest that it shall be known as *Sequonin*.

## Ammonites in the Auriferous Slates of California.

BY WILLIAM P. BLAKE.

Ammonites occur in the gold-bearing slates of Bear Valley, Mariposa County, in addition to belemnites and other fossils already noted. The specimen I have seen is a cast, somewhat distorted by pressure, but apparently similar to the species from the slates on the American River, which I brought to the notice of the academy last year.

---

## Adjourned Annual Meeting, January 8th, 1866.

President in the chair.

Twelve members present.

The Curator of Conchology and the Librarian made verbal reports.

The academy then proceeded to the election of officers for the year, and the following persons were chosen.

PRESIDENT.

LEANDER RANSOM.

VICE PRESIDENTS.

R. E. C. STEARNS. W. O. AYRES, M.D.

TREASURER.

SAMUEL HUBBARD.

RECORDING SEC'Y.

T. H. BLOOMER.

CORRESPONDING SEC'Y.

HENRY N. BOLANDER.

LIBRARIAN.

J. D. WHITNEY.

CURATORS.

| | | | |
|---|---|---|---|
| H. S. HANKS | MINERALOGY. | E. F. LORQUIN | ZOOLOGY. |
| H. N. BOLANDER | BOTANY. | R. E. C. STEARNS | CONCHOLOGY. |
| W. M. GABB | PALÆONTOLOGY. | H. BEHR, M.D. | ENTOMOLOGY. |

COMMITTEE ON FINANCE.

MESSRS. HUBBARD, STEARNS, AND FISK.

COMMITTEE ON PUBLICATION.

MESSRS. WHITNEY, MINNS, AND STEARNS.

Donations to the Library: American Journal of Science, September, 1865, from the editors. Annals of the Lyceum of Natural History of New York, Vol. VIII, Nos. 2–5. Journal de Conchyliogie, (3) V, 1, 2. Sea-Side Studies in Natural History, from Alex. Agassiz. Proceedings of the Boston Society of Natural History, 1864, Sheet 1. Astronomical and Meteorological Observations made at the U. S. Naval Observatory during the year 1863. Check List of the Fossils of California and Nevada, by W. M. Gabb.

The following biographical sketch of Thomas Bridges was read by Mr. Dall.

## Memorial Sketch of Thomas Bridges, Esq., F.L.S., F.Z.S., and Member of the Cala. Acad. Sci.

BY W. H. DALL, ACTING DIRECTOR SCI. CORPS, W. U. T. EX.

Mr. Bridges was born at Lilly in Hertfordshire, England, on the twenty-second of May, 1807.

At an early age he became interested in Natural History, and when about nineteen or twenty—having previously studied for some three years under Sir William Hooker, at Kew Gardens—he sailed for Valparaiso. He remained here or passed the time in some of the adjoining provinces, from 1827 to 1844, when he returned to England on a short visit. On again reaching South America, he undertook the explorations in Bolivia, so well known to naturalists, through their magnificent results. During the course of this journey, in June, 1845, he discovered and obtained seeds of the great South American Water Lily, the *Victoria Regia*, Lindley. Although the plant had previously been detected, to Mr. Bridges belonged the honor of first introducing it into the old world, by transporting seeds which subsequently germinated at Kew.

In 1846, he returned to England, where for many months he was prostrated by severe illness contracted in his arduous explorations.

In 1847, he was married to Miss Mary Benson, of Bristol, England, a niece of the eminent collector, the late Hugh Cuming. Soon after he proceeded again to Valparaiso.

In 1851, he visited and explored the island of Juan Fernandez.

In the report of Lieut. Herndon, U. S. N., on his explorations of the Amazon, he acknowledges his obligations to Mr. Bridges, for invaluable information furnished, in regard to the head-waters of that river.

In 1855, he proceeded to Panama, remaining there some six months; and from thence to England, subsequently to France, and finally to California, where he arrived in November, 1856.

About 1857, he went to British Columbia, and remained nearly two years, collecting and exploring. In the winter of 1858, his family, hitherto in Europe, rejoined him. Since then San Francisco has been his home, though travelling in many parts of California.

In April, 1865, he undertook his ill-starred journey to Nicaragua. His explorations here were limited principally to the lake country, where he passed some five months exploring the dense and tangled jungles of the vicinity; ascending the volcanoes of Mombacho and Ometepec, and visiting Leon and Granada. In June, he met at San Juan del Sur, our well-known botanist, Dr. Torry, on his way to San Francisco. These two kindred spirits passed several pleasant days together.

He left Nicaragua on the steamship Moses Taylor, Capt Blethen, on the third of September, 1865, apparently in perfect health. On the fifth, the effects of the insiduous malaria of the country were evident. On the ninth, he died; being fifty-eight years old. On the seventeenth, the body arrived in San Francisco, and was afterwards interred at Lone Mountain Cemetery. He leaves a widow, two daughters, and three sons.

Mr. Bridges was of a singularly retiring and modest disposition, and very few publications of his own remain to attest his devotion to Natural Science. But works in every branch of study, particularly of Professor Lindley, and Sir William Hooker, in the department of Botany, bear abundant evidence of his untiring industry and unusual success.

That he died a martyr to his love for Natural History, there is no room for doubt; and his most appropriate memorials are the magnificent evergreens now adorning, through his agency, the groves and avenues of the old world.

With all impartial naturalists, Mr. Bridges and such as he, "who bear the burden and heat of the day," are entitled to honors; if not precisely of the same character as those due to the students who in their comfortable libraries work up the results of the collector, still to honors quite as high.

## REGULAR MEETING, JANUARY 15th, 1866.

President in the chair.

Eight members present.

Mr. Bolander presented his report, as Curator of Botany, for the year 1865, as follows.

During the past year the Herbarium of the Academy has been increased—

1st. By a set of Hall's Rocky Mountain Plants.

2d. By a collection of plants from the Western States, made by Mr. Elihu Hall.

3d. By a large collection made by Mr. Canby at Wilmington, Del.

4th. By a small collection from M. S. Bebb, Esq , Washington, D. C.

To the above-mentioned collections, I have added specimens of each plant collected by myself during the past year.

Dr. Kellogg and myself have presented to the Academy quite a number of Australian plants, and both Dr. Kellogg and Mr. Bloomer have assisted me in arranging and classifying our collections.

---

## Regular Meeting, February 5th, 1866.

President in the chair.

Five members present.

Mr. Dall presented the following paper by Dr. Canfield.

### Notes on Antilocapra Americana, Ord.

BY DR. C. A. CANFIELD, OF MONTEREY.

The following notes were taken from 1855 to 1858, in Monterey County, California, and were communicated to Prof. Baird in 1859.

About the first of January the old bucks all shed their horns. A few days after, one was shot, with two hairy stumps or horn-cores, several inches long, just tipped with growing horn. This was observed to spread upward and downward till the whole of the process of the frontal bone was covered with horn. The "prong" commenced the same process at its tip, and gradually coalesced with the main horn, leaving no suture. As the horn increases in length it curves forward and inward. It takes several months to perfect the new horn. The females possess small curved horns, one to three inches long, sometimes recurving to the skull, which were not *proved* to be deciduous.

The horn, when shed, leaves a process of the frontal bone, covered with hair, soon replaced as above by horn at the tip. These facts were more minutely observed in two young bucks, reared by hand to the age respectively of one and two years.

These facts would tend to separate the genus *Antilocapra* from the family *Cavicornia*, and it may possibly form a family by itself.

Prof. W. P. Blake read a portion of a letter from Dr. C. T. Jackson of Boston, containing a notice of a remarkable spider brought from Georgia by Dr. Wilder, an account of which has been published in the Proceedings of the American Academy and of the Boston Natural History Society.

## Regular Meeting, February 19th, 1866.

President in the chair.

Nine members present.

Dr. Colbert A. Canfield, of Monterey, was chosen a Corresponding Member, and Dr. Henry Gibbons and Mr. Henry Janin, Resident Members.

Donations to the Library: U. S. Census, 1860—Agriculture; American Journal of Science, November, 1865, and January, 1866; Proceedings of the Phila. Acad. Nat. Sci., April to October, 1865; Theory of Parallels, by Matthew Ryan; Description of New Species of Pupidæ, by E. S. Morse; Proceedings of Boston Nat. Hist. Soc., Vol. X, Sheet 2.

The following paper was presented.

### Earthquakes in California during 1865.

BY DR. JOHN B. TRASK.

As in the preceding year we have had much frequency in shocks of earthquake, with but trifling damage.

January 9th, 7 h.—A smart shock at Santa Rosa, Sonoma County.

January 19th, 8 h. 8 m.—A light shock at San Francisco.

March 5th, 8 h. 45 m.—A light shock at Visalia, consisting of a tremulous motion, succeeded by a roll or wave after an interval of about four seconds.

March 7th, 23 h.—A smart shock at San Francisco.

March 8th, 6 h. 22 m.—A smart shock at San Francisco.

March 30th, 7 h. 28 m.—A very smart shock at San Francisco; this was felt at Oakland.

April 15th, 0 h. 40 m.—A severe shock occurred at San Diego, consisting of three waves, following each other in quick succession; the shock was preceded with a loud rushing sound.

April 18th, 13 h. 31 m.—A light shock at San Francisco, and noticed at Angel Island and Oakland. This shock was severe at San Juan (south), and felt at precisely the same hour.

April 27th, 15 h. 56 m.—A shock at San Francisco.

May 24th, 3 h. 21 m.—A smart shock at San Francisco, consisting of a single wave. At San Juan (south) the earthquake consisted of two sharp shocks, and at Santa Cruz of one only. At the latter localities it was three and four minutes later than at this city.

September 22d (no hour).—A smart shock occurred at Yreka.

October 1st, 9 h. 15 m.—A very smart shock was felt at Fort Humboldt, and throughout the district of Humboldt Bay.

OCTOBER 8th, 12 h. 46 m.—A severe shock at San Francisco. This earthquake was the most violent of any occurring on this peninsula since the American occupancy, but was not sufficiently heavy to do serious damage; all the injuries sustained to property were of a trivial nature, the principal being the demolition of parts of the parapet walls erected above the roofs, to shield the latter in cases of fire in adjoining buildings; the fracture of walls in every instance occurred in insecure buildings, and heavy buildings erected on the made lands of the city front.

At San José, Santa Clara, and Santa Cruz, the earthquake appears to have been equally severe as in this city. At Petaluma, on the north, it was also quite severe. At Sacramento the shock was not marked by the same severity as at the other localities mentioned. At Stockton the shock was heavy, but no damage done, nor was there any damage at Sacramento. The shock was severe at Grass Valley.

The direction of the wave in this earthquake was north fifty degrees west; the limited area over which it extended has not furnished sufficient data to calculate its velocity.

This earthquake differs from all others that have occurred in this locality in this particular: the earth continued to vibrate with increasing and again decreasing degrees of force for ten hours, at no time entirely ceasing during this period.

22 h. 1 m., another light shock, consisting of a single vibration.

23 h. 50 m., another shock. After this shock the vibrations of the earth ceased to be noticeable.

OCTOBER 9th, 10 h. 34 m.—Another light shock.

11 h. 32 m., another shock. After this shock the earth continued to vibrate at intervals till noon of the tenth.

OCTOBER 13th, 2 h. 5 m.—A smart shock at San Francisco; felt at Oakland and Santa Clara; also at Angel Island.

OCTOBER 14th, 23 h. 45 m.—Another shock at San Francisco.

OCTOBER 15th, 3 h. 40 m.—Another shock at San Francisco.

NOVEMBER 24th, 3 h. 45 m.—A smart shock at Watsonville, Santa Cruz Co.

DECEMBER 7th, 1 h. 15 m.—A light shock at San Francisco.

Professor Whitney presented the plate published by Mr. Haidinger, the distinguished Chief of the Austrian Geological Survey, to exhibit the structure of the Carleton meteoric iron. This plate, together with an elaborate article describing the appearance and structure of this meteorite, is published in the proceedings of the Vienna Academy of Science, Vol. XLVIII, page 301.

Professor Whitney also made some remarks on the nature and distribution of the meteorites which have, up to the present time, been discovered on the Pacific Coast and in Mexico; of these remarks the following is an abstract.

It is remarkable that no meteoric stones have ever been discovered, either near the Pacific coast or, indeed, so far as we know, anywhere on this side of the Rocky Mountains. Masses of meteoric iron, on the other hand, are known to exist in quite a number of localities, and many of these masses are of very large size.

On page eleven, of the third volume of the Academy's Proceedings, I have given a list of the localities of meteoric iron known in Arizona and Northern Mexico. This was done in order to attract the attention of explorers and prospectors to these remarkable masses, and in the hope of getting more definite information in regard to some of them. Indeed, some additional items have already been obtained in reference to the masses there noticed.

It is stated by several persons who have visited Southern Arizona, among whom Dr. Horn may especially be mentioned, that it is universally believed, and vouched for by apparently trustworthy explorers, that there are many large masses of iron near the summit of the range next east of Tucson. This is called on the latest map of Arizona, (that published by Mr. Gird) the "Sierra de la Santa Caterina." Whether this is the same as the "Sierra de la Madera," mentioned by Velasco, as the locality of "enormous masses of pure iron, between Tucson and Tubac," I have been unable to ascertain.

Dr. J. B. Trask saw, in August, 1849, a large mass of meteoric iron, at the village of Rio Florida, partly buried in the ground at the corner of the plaza. This may, perhaps, be the same mass mentioned by Mr. Bartlett, as existing "at the Hacienda de Concepcion, on the road from Chihuahua to Rio Florida." Dr. Trask. however, has a distinct recollection that the mass he saw was at the village of Rio Florida, and not at the Hacienda.

Dr. Veatch saw, in 1849, a large mass of iron at Santa Rosa, Coahuila, which was then in use as an anvil, at a blacksmith's shop, and was informed that many pieces of native iron had been used there for various purposes. The mass which Dr. Veatch saw, was of about the size of an ordinary anvil. It was said to have been brought from the mountains northwest of the town. This statement corroborates that of Schott, in the Mexican Boundary Report. (Vol. I, Part 2, page 34.)

It is a remarkable fact, considering the abundance of meteoric iron near our borders, that no meteorite, either stony or metallic, has yet been found within the limits of California. The piece of iron from Honcut Creek, found by Dr. Trask, and supposed to be of celestial origin, proved, on careful examination, to be ordinary cast iron. A fragment of the mass was referred to Professor Brush, and pronounced by him not to be meteoric. The existence of a piece of cast iron, in the locality where this was discovered, is not easily explained. In connection with what has just been said of the existence of meteoric iron in California, it should be added, that Dr. J. G. Cooper thinks that he observed some small pieces of native iron on the Mohave River, a little above its sink. By accident no specimen of this supposed meteorite were saved, so that it is not possible to say that Dr. Cooper may not have been mistaken. The attention of explorers in that region is invited to this supposed locality.

An additional reason for believing Dr. Cooper's observations to be correct is, that the locality lies in the prolongation of the path or belt in which a considerable number of masses of meteoric iron have already been found. It is certainly either a very interesting fact, or else a remarkable coincidence, that the localities of meteoric iron in Arizona and northern Mexico, lie nearly in a straight line with each other, which line extends from northwest to southeast, for a distance of twelve hundred and fifty miles, or from the Colorado River, at La Paz, to the province of San Luis Potosi, in Mexico. Along this line, at points from two hundred to two hundred and fifty miles apart, in some places one mass of iron, and in others quite a number of them, have fallen, indicating very strongly a common origin for the whole, or that they may all be fragments of one immense meteor which passed diagonally across the continent, throwing off masses in its progress. The large mass of iron discovered by Dr. Evans, on Bald Mountain, near Port Orford, in Oregon, is in a locality not far distant from the path of the supposed meteor.

The belt of meteoric iron masses may also be prolonged much farther to the south, through Mexico, and in the same general southeasterly direction, as far as the province of Oaxaca. The localities in the provinces of Durango, Zacatecas, Mexico, and Oaxaca lie very nearly in the same northwest-southeast direction from each other; but are in a line a little to the west of the main belt which has been traced down from the Colorado River. It is certain that the central part of Mexico has been highly favored in respect to the distribution of meteoric iron masses, which are not only of frequent occurrence, but often of large size. Perhaps it may be not too wild a speculation to suggest, that the grand disruption of the meteor may have taken place in this part of its course, and that the fragments were scattered far and wide in all directions. It certainly seems difficult to account for the peculiar position of the masses of iron found on the Pacific side of the continent, and their great abundance in central Mexico, on any other theory than the one which has here been suggested.

Authorities are not at hand for comparing the chemical composition of all the masses belonging to this series, or belt, which have been analyzed; but it is my impression that those meteoric irons which have been examined do resemble each other sufficiently, in the nature and proportion of the ingredients they contain, to add to the probability of their having had a common origin. The specimens thus far analyzed do not represent more than half the localities known to exist. A farther and more complete investigation of the physical and chemical character of all the meteoric masses of Arizona and Mexico, with reference to the possibility of their being originally parts of one body, is suggested as an interesting subject for those specially devoted to this class of researches.

The following resolution, introduced by Professor Whitney, at a previous meeting, in accordance with the Constitution, was adopted.

*Resolved*, That any Corresponding Member who may take up his residence in this city, may become a Resident Member, on notifying the Recording Secretary that such is his wish.

Mr. W. H. Dall was elected a Resident Member, December 4th, 1865.

---

## REGULAR MEETING, MARCH 5th, 1866.

President in the chair.

Eleven members present.

Donations to the Library: Société de Géographie de Genève; Memoires et Bulletin, Tomes I–III; From F. Berton.

The following papers were presented.

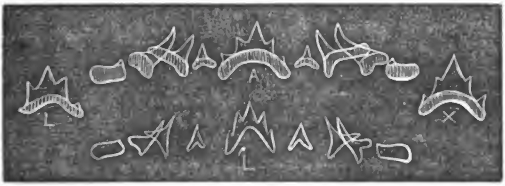
### Note on Octopus punctatus, Gabb.

BY W. H. DALL, ACTING DIRECTOR SCI. CORPS W. U. T. EX.

A half-decayed specimen of this species, (described by Mr. Gabb, in Proc. Cal. Acad., Ap. 7th, 1862) discovered in some alcoholic miscellanea, recently, afforded the following observations.

The buccal plates or mandibles, resemble those of *O. tuberculatus*, Blainv. [Woodw. Man. Pl. I. *Fig*. 2] but are more produced longitudinally. They are black and very brittle.

(*Fig*. 27.)



Dental formula, 3·3·3 (*Fig*. 27, A), or $\frac{1}{1\times1}\cdot2\cdot1\cdot$

*Rhachis* armed with one central quinquedentate tooth, and two lateral, simple, denticles; the insertion of all is broadly arcuate. The *pleuræ* are provided each with two simple recurved uncini and one rhomboidal plate with a small recurved hook. The central rhachidian tooth is occasionally irregular. (*Fig*. 27. L, X). When immature, the dental laminæ are without color, more slender, compressed, and the dentations are less distinct. (*Fig*. 27 L.) Immature rows, about 15, perfect 60, worn and broken 25. total 100. Mag. 100 diameters. Length of specimen 3 feet. Locality, near San Francisco. From the market.

Professor Whitney communicated the following abstract of the results obtained by M. Rémond in his geological explorations of Northern Mexico, made in 1863 to 1865, and drawn up from his notes and specimens, after reference of the fossils obtained to Mr. Gabb and Dr. Newberry. M. Rémond has gone to Chili to continue his geological investigations, if his health permits; and he expects to write out a more detailed account of his Mexican work, whenever he has an opportunity of doing so. In the mean time, however, it is his desire that this abstract should be drawn up and published, that at least the more important results may be placed as soon as possible in the hands of those interested in the development of the geological structure of those countries which border on the Pacific coast. In presenting this paper, Professor Whitney desired to express his admiration of the courage and endurance with which M. Rémond had prosecuted his investigations in Mexico, where he had to contend with every kind of difficulty and danger, but where, however, he had obtained results of great value, throwing the first rays of light on the age of the formations of a very interesting and economically important mining region—a region which has been often visited, but where, previous to M. Rémond's examinations, no positive evidence of the geological position of any of the stratified rocks had been obtained, and no clue given to the relations of the metalliferous veins to each other, or to the rocks in which they are inclosed.

## Notice of Geological Explorations in Northern Mexico.

BY A. RÉMOND.

[Compiled from his notes, and prepared for publication, by J. D. Whitney.]

### I. PRELIMINARY REMARKS.

The mountainous region comprising the central and western portion of Northern Mexico, belongs to the four States of Durango, Chihuahua, Sinaloa, and Sonora. Considering how celebrated this portion of Mexico has become for its mines and metalliferous veins, and how much has been written about it, it is surprising how little exact information has hitherto been obtained with regard to either its geography or geology. On comparing the principal published maps* of the region in question, it will be seen at once how much they differ from each other in their delineations of even its main topographical features, while the details are entirely wanting.

---

*The best map of Northern Mexico is that of M. de Fleury, published in San Francisco, in 1864; but this makes little pretense to a delineation of the topography; the courses of the principal streams and the position of the larger mining towns are often very far from being correct, as must be expected on a map constructed without a basis of instrumental surveys. J. D. W.

The name of the "Sierra Madre" is usually applied to the main range of mountains of this country, or the western border of the plateau which stretches north through the territories of the United States, forming what may be called the great orographical feature of the continent. In Northwestern Mexico this crumpled border of the great plateau comprises an extensive mountainous region, by no means forming a continuous single chain, but rather several central ranges, with associated groups of parallel ridges, all having the same general course, which is approximately north-northwest, and south-southeast. As the breadth of the chain widens as we go towards the north, so, too, that of the valleys increases in that direction, the whole system of mountains and valleys spreading out in something like a fan shape.

Going north, the chain appears to sink gradually, although determinations of altitude in Northern Mexico are extremely few in number. It is certain that there is, in about latitude 32°, a depression of the mountain ranges which extends entirely across the continent, and which would enable the traveler to cross from the Atlantic to the Pacific, without necessarily surmounting any elevation greater than four thousand feet.* The southeastern range is the highest, and the culminating point is said to be the Cerro de Cuiteco, sixty leagues northeast of Jesus Maria, on the western border of Chihuahua. The approximate altitude of the Cumbre de Basaseachic is seven thousand four hundred and twenty-nine feet, and that of Guadalupe y Calvo, seven thousand eight hundred and twenty-five feet. To the north, the ranges east of Sahuaripa are also very high; but they have never been measured. No peaks or ridges, however, in this portion of Mexico attain anything like the elevation of the higher portion of the Sierra Nevada, few if any points exceeding ten thousand feet in altitude.

The direction of the sierra is nearly that of a line connecting some of the best mining districts in Mexico, which are situated on or very near the summit of the mountains. These districts are the following, enumerating them in their geographical order from the south towards the north: In Durango, San Antonio de las Ventanas, Guarisamey, and San Dimas, remarkable for their auriferous silver ores, and sixty-two Mexican leagues northeast of Mazatlan; in Chihuahua, Guadalupe y Calvo, and San Pedro de Batopilas, yielding fine specimens of native silver; also, Jesus Maria, in the same State, and the Real del la Cieneguita, Sonora, with silver and gold mines.

## 2. General Geology.

The geological structure of the occidental slope of the Sierra Madre, as well as that of the other parts of this great chain, is exceedingly interesting, and, as yet but very little known, notwithstanding the valuable investigations of Humboldt and other eminent men; for, up to the present time, the age of the different formations has never been fixed with any degree of accuracy, from want of materials and of sufficient observations. In 1863, 1864, and 1865, however, I explored quite a number of localities in northwestern Mexico, and was thus enabled to obtain a pretty good general idea of the geology of that region; and, in Sonora, to which my attention was especially devoted, I succeeded in finding fossils in sufficient quantity to allow of the determination of the age of the principal formations of the northern Sierra Madre. By tracing the connection of these rocks with those of Central Mexico, additional light will be thrown on those districts of which, at present, but little is definitely known.

---

*See Emory, in Mexican Boundary Report, vol. 1, page 41.

The igneous rocks, which occur more abundantly on the Pacific slope, are granites, either fine or very coarse-grained; porphyries, more or less feldspathic; and greenstones, all of which are cut by numerous dykes of extremely varied character. The granites, however, are very poor in veins of the precious metals, while the porphyries are highly metalliferous. In Sinaloa (Candelero) and Durango (San Dimas) we see that the granites underlie the metalliferous porphyries, and that the greenstones, in Sonora, (near Hermosillo and in the vicinty of La Haciendita) penetrate through them.

The oldest sedimentary rocks, which I have observed, belong to the Carboniferous series; this is represented in the eastern part of Sonora, by heavy masses of limestone, forming very high and rugged ridges, running a little west of north. The upturned strata are seen, in many places, to rest on granite. Argentiferous veins occur throughout this formation.

The next group of sedimentary rocks, in order, is the Triassic; this forms isolated mountain groups in Sonora, and offers an interesting field for investigation. Instead of limestones, it is made up of heavy beds of quartzites and conglomerates, with coal-bearing clay shales; all of these are disturbed and elevated, and rest on greenstones, feldspathic porphyries, or granite. Wherever metamorphosed, the Triassic rocks are auriferous and contain veins of silver ores. The metamorphic slates and limestones of the Altar and Magdalena districts, which include the richest gold placers of Sonora, may possibly be of Triassic age; but the fossils collected are too imperfect to admit of this being determined. There are some reasons for believing those rocks to be rather of Jurassic than of Triassic age, as they differ in lithological characters from both the Triassic and Carboniferous of Northern Mexico, resembling, rather, the Jurassic gold-bearing slates of the Sierra Nevada, in California; besides, they lie outside and to the west of the Sierra Madre. It may also be noticed that the gold which they furnish does not resemble that obtained from the Triassic strata.

The Cretaceous period is also represented at the foot of the Sierra Madre, at Arivechi, in Sonora. The strata belonging to this series are chiefly argillaceous shales, and they rest upon porphyries and Carboniferous limestone. They have been disturbed and elevated since their deposition. The fossils, which they contain in great number and in a fine state of preservation, will be noticed farther on.

All the above mentioned formations were already in existence before the first eruption of the volcanic rocks took place. These latter are found scattered along the whole Pacific coast, and extend from the Gulf of California up to the very summit of the sierra. It is very interesting to see the volcanic formations spread over so extensive a region, especially as there are no active volcanoes known in Northern Mexico, and not even any indications of ancient craters or vents.

The lithological character of the eruptive materials is extremely varied, and there seem to have been several periods of igneous action preceded by as many disturbances of the strata, all of which took place after the close of the Cretaceous epoch. Three different series of volcanic rocks may be observed in Sinaloa and Sonora, unconformable with each other; and these may again be subdivided into groups, after a thorough examination has been made of the extensive suite of specimens which has been collected. The lower, or oldest series, affords several hundred varieties of porphyries, characterized by crystals of feldspar or augite. There are also very peculiar trachytic rocks, resembling granite in appearance. These volcanic materials occur in beds or in masses, and are frequently cut by dykes; but they are quite destitute of veins containing gold or silver, the only metalliferous ores they contain being those of copper (?) and iron, and these in small quantity. Various volcanic ridges in Sonora belong to this class. The second series consists of extensive beds of micaceous, trachytic tufas, and breccias, all more or less uplifted since their deposition, and covering the different igneous and sedimentary formations as well as the older volcanic porphyries. These attain a great thickness, between San Dimas and San Ignacio, in Durango and Sinaloa.

Above these formations occur ancient alluvial deposits, with bones of extinct animals (elephants) at two localities; near La Noria, northeast of Mazatlan, and in the Arroya de la Palma, two leagues east of La Casita, in Sonora.

Sheets of basaltic lavas, somewhat similar to those of California, and probably of the same age, forming with tufas the upper volcanic series, overlie the other formations, occupying a nearly horizontal position.

The most recent formation is that of the terrace deposits of sand and gravel, which occur in Sonora.

Having thus given a general sketch of the principal groups of rocks developed in the region in question, I pass to a more detailed description of the different formations.

## GRANITES.

Underlying all the rocks in Durango and Sinaloa, and probably posterior to the Carboniferous limestones, which they have in places extensively metamorphosed, are masses of granite. These may be seen in many places between the coast and San Dimas, either occupying the bottoms of the valleys, or forming independent hills. There are two well-marked varieties: Of these the first are syenites, more or less fine-grained, and consisting of a mixture of feldspar, variously colored, quartz, black or green hornblende, and black or brown mica, the latter usually in hexagonal plates. Localities of this variety are: Haval, Las Higueras, San Ignacio, Santa Apolonia, Candelero, La Noria, Zaragoza, etc., in Sinaloa; San Marcial and Tecoripa valleys, Hermosillo, in Sonora. The other variety is either very coarse-grained, consisting of white feldspar, gray quartz, and plates of silvery mica, or else finer grained, and chiefly made up of feldspar; these occur, forming mountains and ridges in Sonora, in the Sierra del Amolé, near La Magdalena, Sierra del Espinaso Prieto, near Hermosillo, and the Sierra de Mazatan, south of Ures. The fine-grained granites contain argentiferous veins at Zaragoza, in Sinaloa, and east of Topisco, in Sonora. These are traversed by numerous intersecting dykes of diorite, feldspar, and quartziferous and feldspathic porphyries, especially well seen near Hermosillo, and the Cajon de los Carrisos, east of San Antonio de la Huerta. There are no metalliferous veins where the granite is thus intersected by dykes.

### Metalliferous Porphyries.

These may be divided into two groups. The first consists of a rock occurring in large irregular masses or beds, and having a dark colored argillaceous base, through which are disseminated small crystals of whitish feldspar. This variety, which is probably older than the granites, includes some of the richest mines of the Sierra Madre; as those of Candelaria, Bolaños, Cinco Señores, etc., near San Dimas, in Durango; and which have yielded over $20,000,000. There are also rich veins in this kind of rock at Candelero, fifty-two leagues northeast of Mazatlan, in Sinaloa. All these veins run northeast and southwest, and are cut at right angles by dykes. The second variety of porphyry is a gray feldspathic rock, apparently made up of labradorite and magnetic iron ore; this overlies the greenstones, and is covered by the Triassic beds at Los Bronces and San Javier, where there are three systems of argentiferous veins. The Nahuila mine, one of the best in Sonora, is in this rock.

### Metamorphic Rocks.

Heavy masses of metamorphic rocks may be seen at various localities in Sinaloa and Durango (Tecomate, Tenchoquelite, Arroyo del Ciruelo, Arroyo de San Vincente) resting either on the granites or the metalliferous porphyries. These rocks occur in masses or beds, sometimes distinctly stratified, and sometimes without any traces of the original bedding. They are always much altered and broken up. Their lithological characters are not well marked, although the series is easily recognized. The rocks referred to in this division, are usually fine-grained, of a greenish or bluish color, when not too much decomposed, and somewhat argillaceous in composition. At the base they pass into porphyries. The argentiferous veins cut both the metamorphic and the porphyritic rocks at Tecomate, on the Rio de San Ignacio, where the dip of the formation is to the northeast, at an angle of 70°. Between La Puerta and El Pilar, Arroyo de San Dimas, they occur in jaspery layers, ribboned with green and brown hues, and resemble some of the metamorphic Triassic rocks of Sonora. Near Candelero, the metamorphic rocks are associated with whitish, semi-crystalline limestone. The formation in question may be observed in many other localities in Sinaloa, always resting on granite and passing into porphyry; it is also sometimes associated with metamorphic slates.

### Greenstones.

These rocks occur in heavy masses or in beds, and are made up of a fine-grained, compact mixture of hornblende and feldspar, often containing mica, and having a greenish color. The greenstone underlies the Triassic rocks, and in many places it protrudes through the granite. This rock is highly metalliferous at Copála, Sinaloa, and also at Los Bronces and San Javier, in Sonora.

The greenstones or diorites which occur in the granite, appear to be anterior to the metalliferous greenstones, and the latter are posterior to the Triassic.

### Carboniferous Limestones.

The Carboniferous limestones form high ridges parallel with the general course of the Sierra Madre, from Hermosillo, north of Guaymas, east of Sahuaripa. These ridges become more elevated as we approach the crest of the Sierra. The rocks of this formation are fine-grained and bluish in color, and form heavy beds with intercalated schistose layers; they contain nodules and beds of flint. There are some clay slates at the base of the formation. The thickness of the whole series is probably over five thousand feet. The principal localities where these Carboniferous rocks may be observed are as follows, naming them in order from west to east:

1st. Hermosillo, where they rest on syenitic granite and are highly metamorphosed, the limestones being converted into white saccharoidal marble, and the slates into garnet and epidote rock. Dykes of green porphyry cut through the beds of sedimentary rock, which beds have a strike of about N. 65° W., and stand nearly vertical.

2d. Five leagues from Hermosillo, at La Cruz; in the Cerro de Santa Teresa on the south, and the Sierra de Las Animas on the north. Here the limestones contain crinoids.

3d. Four leagues farther on, between La Noria and El Aguajito; here are high granite ridges with a granite axis.

4th. Twenty leagues from Hermosillo, south of Ures; Carboniferous rocks upheaved on the southwest side of the granitic Sierra de Mazatan. The direction of this range is from northwest to southeast, and its height sixteen hundred varas, according to M. De Fleury; here are a few silver mines.

5th. Haciendita, nine leagues farther northeast. The beds here are metamorphosed and much disturbed, dipping northeast; these outcrops form low hills.

6th. Between Mátape and Batuco; a very high ridge of granite, running in a northerly direction, with limestone resting upon it. To the north and east of Topisco the limestones attain a great thickness and afford fine fossils. At the Cerro de la Bonacina, one of the highest points of the range, a variety of corals, crinoids, and brachiopods may be seen weathered out from the surface of several beds of hard, compact limestone, of various colors; these beds are near the summit of the mountain. This locality was first discovered by Don Antonio Moreno, Engineer of the Bronces mine. The strata here are much disturbed, and appear to have been folded into a mass with a synclinal structure.*

### Triassic Rocks.

This formation is usually highly metamorphosed, and passes into porphyries at its base. The strata are more or less inclined, and the lower beds are very much contorted and disturbed. The rocks referred to the Trias extend from Soyopa to San Javier; but they are developed on a more extensive scale between San Antonio de la Huerta and Los Bronces, forty-two leagues northeast of Guaymas. The Triassic rocks form a chain of high and rugged mountains extending from south-southeast to north-northwest. The isolated mining districts of Tecoripa and San Marcial (between Los Bronces and Guaymas) are in the same formation; it also crops out from under the stratified volcanic rocks at the Punta de Agua, between San Marcial and Guaymas. The metalliferous greenstones and porphyries, previously noticed, form the nucleus around which the Triassic beds have been upheaved. These beds are seen near San Javier and Los Bronces, two mining towns which are situated on greenstone, but which skirt the foot of a small ridge of feldspathic porphyry, much less elevated than the metamorphic rocks themselves. They are also seen overlying granite, near the Cerro Colorado, between Soyopa and Los Bronces, and south of Tecoripa. The Cerro de la Nahuila, the highest point but one in the district, lies southeast of the Sierra de Mazatan. There are three principal divisions of the Triassic, which occur in the following order, the first mentioned being the lowest:

---

* Only a few specimens of the Carboniferous fossils collected by M. Rémond have ever been received, owing to circumstances connected with the present political condition of Mexico. It is hoped, however, that they are not lost, and that they may yet be recovered. Among the few specimens received is a coral, not to be distinguished from the *Lithostrotion* (*L. mamillare*) found near Bass's Ranch, in Shasta County, California. J. D. W.

1. 
   - Quartzites and clay slates;
   - Black, jaspery schistose layers;

   or, where the rocks are less altered:

   - Black clay shales with beds of coal;
   - Argillaceous sandstones.
2. Quartzites, in great thickness.
3. Heavy beds of conglomerate.

The interstratified clay shales and grits of the lower member, crop out in several places along the Cañada de Santa Maria, at the bottom of the ravines below Los Bronces. Here, there are three or four beds of good anthracite coal, with a considerable number of well-preserved plants occurring in the associated clay shales, both above and below the coal.

[A portion of these plants were referred by me to Dr. Newberry for examination, and he has given the following list of them. 1. *Strangerites magnifolia*, Rogers; Trans. Assoc. Am. Geologists, p. 306, Pl. xiv. A species occurring in the Trias (?) of Virginia and North Carolina. 2. *Pecopteris falcatus*, Emmons; Geol. of N. Car., Pl. iv, fig. 9. The specimens are too imperfect to decide on the identity of this plant with *Saccopteris germinans*. ? 3. *Pecopteris bullatus*, Bunbury; only in fruit; nervation obscure; identity not certain, but very probable. 4. *Otozamites Macombii*. Newb. At top of "red beds" or "gypsum formation," at the base of the Cretaceous rocks, copper mines near Abiquin, New Mexico. There is no doubt about this species, and it forms an important connecting link. ? 5. *Pterozamites decussatus*, Emmons; specimens very imperfect. 6. *Pecopteris*, n. sp.; a very neat and peculiar species as yet undescribed. It may be the same as one badly figured by Emmons (Pl. II, fig. 1.)

7. *Alethopteris*, n. sp.; small fragments of the frond of a splendid new species. From this enumeration it will be seen that there can be but little doubt of the Triassic age of the formation in which these plants occur. A large lot of these plants, collected by M. Rémond, has been recently received, and among them are much better specimens of some of the species noticed by Dr. Newberry, and several quite new ones. These will also be examined, described, and figured within a short time. J. D. W.]

The strike and dip of the clay shales in the different ravines vary considerably, but the dip is usually to the southeast. The superincumbent quartzites are more regular in their inclination. There are dykes of feldspathic rock cutting through both the coal and the shales.

The following section represents, in an ascending order, the position of the coal-bearing strata in the Cañon del Retiro, near Los Bronces.

1. Coarse quartzites with conglomerates.
2. Conglomerate, 8 feet.
3. Argillaceous and schistose grits, 3 feet.
4. Clay shales, with impressions of plants, 8 feet.
5. Gray grits, 4 feet.
6. Bluish clay shales with ferns, 12 feet.
7. Coal, 2 feet.
8. Compact black clay shales, 5 inches.
9. Coal, 2 feet 6 inches.
10. Clay shales with leaves, several feet.
11. Coarse grits.

Another section, measured at the foot of the Cerro de la Aguja, was as follows.

1. Compact gray grits.
2. Gray clay shales with seams of coal and plants, 4 feet 6 inches.
3. Bluish argillaceous grits, 2 feet 6 inches.
4. Contorted black clay shales, with seams of coal, 5 feet 6 inches.
5. Coal, 2 feet 6 inches.
6. Black, compact clay shales, 3 feet.
7. Coal, 7 inches.
8. Carbonaceous clay shales, 8 inches.
9. Coal, 3 inches.
10. Clay shales and argillaceous grits.

[Specimens of the coal brought to San Francisco by M. Rémond, are anthracite, evidently of superior quality. J. D. W.]

The middle member of the Triassic series consists of quartzites, or metamorphic sandstones; these are both coarse and fine grained, and sometimes brecciated. They vary in color, from white to red, and are often much altered in the vicinity of the metalliferous veins. The upper member of the series, as seen in the Cañada de la Tinta, is made up of rounded pebbles of black jasper and gray quartzite; in the Cañada de los Mimbres, below Los Bronces pebbles of specular iron are included in the mass. The dip of the formation is very irregular, both in direction and amount.

At San Antonio de la Huerta, Tecoripa, and San Marcial, argentiferous veins of various ages occur in the lower and middle members of the Trias. At San Marcial, marine (?) shells are found in the clay slates, near the silver mines;

[but those which have been obtained, are too imperfect for recognition; they were referred to Mr. Meek for examination. J. D. W.]

At San Marcos, between San Antonio de la Huerta and the Real Viejo, metamorphic jaspery slates occur in connection with the carboniferous limestones; they are probably of Triassic age. Gold is found in the gulches between the quartzite ridges, as in the Cañada de la Higuera, near Los Bronces, in the Cañada de la Iglesia, between the latter place and San Antonio de la Huerta, and generally where the quartzites occur.

## JURASSIC (?) ROCKS.

In the eastern part of the Magdalena and Altar districts, are valleys with low hills and ridges of auriferous clay slates, with interstratified beds of porphyry and diorite. Localities of these rocks are Cerros de la Barajita, between Querobabi and Santa Ana; Cerritos de la Tierra Colorada, where the formation contains beds of variously colored limestones, entirely made up of fossils. South of La Magdalena this formation rests on metamorphic sandstones and shales. [The reasons for referring these rocks, with doubt, to the Jurassic formation, have been already given; see page 246.]

## CRETACEOUS ROCKS.

In the Sahuaripa Valley, four miles east of Arivechi, and seventy-two leagues northeast of Guaymas, is a locality of Cretaceous Fossils of great interest. The hill in which they occur is called "Cerro de las Conchas," or "Shell Mountain." The rocks exposed are unfossiliferous strata of coarse-grained sandstone at the base, overlain by clay shales and argillaceous limestone filled with fossils. The exposure is very limited in extent: the shales are a few hundred feet thick, and they dip to the east, as do also the beds of carboniferous limestone on which the Cretaceous deposits rest. Masses of porphyry crop out from under the shales, without there being any peculiar indication of metamorphism or disturbance in their vicinity. Other patches of shelly rock are said to occur in the valley on the eastern side, at the foot of the sierra. [A small lot of fossils collected here by M. Rémond were referred to Mr. Gabb for examination; and since that, a considerable number of additional specimens have been received, but have not yet been investigated. Several species were identified as already described from Texas, and figured by Roemer in "Die Kreidebildungen von Texas;" these are, *Ammonites pedernalis*, von Buch; *Natica pedernalis*, Roem.; *Turritella seriatim-granulata*, Roem.; *Gryphæa navis*, Hall; *Cyphosoma Texanum*, Roem.; *Eulima Texana*, Roem. Besides these, two other species are identified, namely; *Cardium multistriatum*, Shum., and *Turbinolia Texana*, Con.

There is a considerable number of new species among the specimens from this locality, among which the following genera are represented: *Turritella*, *Chemnitzia*, *Avellana*, *Cardium*, *Trigonia*, *Panopæa*, *Pinna*, *Cucullæa*, etc. These will be described and figured by Mr. Gabb, who also remarks that the character of the fossils indicates a closer relationship of the formation to the eastern Cretaceous than to that of California.—J. D. W.]

### VOLCANIC ROCKS.

Stratified volcanic deposits cover a broad area of the surface between San Ignacio and San Dimas (Sinaloa and Durango); they dip to the west. On the other side of Durango they dip in the opposite direction. The serrated edges of the strata may be seen from a great distance, and are extremely picturesque, towering up like old ruins, their peculiar forms being due to erosion. They are well seen in the Cerro de los Frayles, near Guarisamey, in Durango, visible from Mazatlan. These belong to the second series of volcanic rocks. In Sonora there are three different series of volcanic deposits which form serrated, picturesque, parallel ridges, running north from Guaymas as far as La Magdalena, or over eighty leagues in a straight line. The three main ridges, enumerated from west to east, are, 1, Las Tetas de Cabra; 2, Guaymas de Zaragosa; 3, Range north of the mouth of the Yaqui River. The description of the various volcanic deposits of Northern Mexico may be reserved for a separate memoir, as the number of them is very great.

### MINES.

The richest and widest veins are those northeast of Mazatlan, near San Dimas, Guarisamey, etc., in Durango. These veins cut all the rocks older than the Cretaceous, whether igneous or sedimentary. The mines of Sinaloa are richer than those of Sonora. In the former State the ore-bearing portion of the veins is from a few feet to several yards in width: in the latter, generally from one to two feet. In Durango and Sinaloa gold, native silver, and sulphuret of silver occur associated with galena, yellow blende, and iron pyrites. In Sonora the principal ores are argentiferous gray copper, with galena, black blende, copper pyrites, arsenical pyrites, carbonate of lead, ruby silver, arsenical silver, and gold. Each mining district is characterized by a peculiar system of veins; in all as many as twenty different systems have been observed. The most abundant vein stones are quartz, either chalcedonic, crystalline, or massive; brown spar; heavy spar; oxide of iron. The veins occurring in the metamorphic Triassic rocks, are usually parallel with the stratification, so that they lie nearly horizontal where the formation has been but little disturbed. As to the yield of the silver ores, it varies extremely, and it would be necessary to enter into a full description of all the different districts to give an idea of it. It may be noticed, however, that the arsenical pyrites, which is auriferous in the Sierra Nevada, becomes argentiferous in the Sierra Madre. The veins vary in their direction from a little east to a little west of north; the richest ores near San Dimas run northeast and southwest. There are but few rich mines in Sonora, a state of which the mineral wealth has been much exaggerated. There are, however, some deposits of variegated copper, and veins of magnetic and specular iron.

The annexed tabular statement will give the principal facts obtained with regard to the mines examined in Northern Mexico.

# TABULAR STATEMENT,

## SHOWING THE POSITION AND CHARACTER OF THE PRINCIPAL MINES OF NORTHERN MEXICO.

BY A. RÉMOND.—1863-1865.

| Mines. | Location. | Country. | Strike. | Dip. | Width. | Matrix. | Ores. | Yield. (Per Ton.) |
|---|---|---|---|---|---|---|---|---|
| **Naghuila** | Near San Javier | Labrador porphyry | N. 35° W. | 50° N. E. | 1½ ft. | Crystalline quartz | Sulph'ts of zinc, lead, iron, arsenical & copper pyrites; ruby silver & native silver. | 1st class $1200<br>2d class $125 |
| **Eureka** | Bet. S. Miguelito & Los Bronces. | Greenstone | N. 45° W. | 35°-40° N. E. | | Quartz | Mispickel, blende, galena | |
| **Pleiteada** | Near San Javier | Labrador porphyry | N. 30° W. | 45° N. E. | 1½ ft. | Quartz | | |
| **San Juan** | Near San Javier | Quartzite (triassic) | N. 65° E. | 50° S. S. E. | 4 ft. | Quartz and iron ore | Galena, zinc, carbonate of lead, iron pyrites | |
| **Ceballos** | Near Los Bronces | Labrador porphyry | N. 25° E. | 85° S. S. E. | 2 ft. | Magnetic iron | | |
| **Higuera** | Near Los Bronces | Greenstone | N. 5° E. | 80° E. | 2½ ft. | Magnetic iron | Copper pyrites and gray copper ore | |
| **La Blanca** | Near San Antonio de la Huerta | Q'tzite and conglom'e (triassic) | N. and S. | 15° E. | | Vesicular quartz | Gold and chloro-bromide of silver | $43 |
| **San Luis** | Near San Antonio de la Huerta | Quartzite (triassic). | N. 40° W. | 35° N. E. | 1½ ft. | Decomp. quartz and sulphate of baryta | Blende, galena, mispickel, sulphuret of iron, native silver | 1st class $787<br>2d class $125 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Santa Barbara** | Near Corral Viejo | Quartzite | N.E. to S.W. | 30° S. E. | 1½ ft | Quartz | Galena, carbonate of lead, iron pyrites, gold | $67.75 |
| **La Sierra** | Near San Javier | Labrador porphyry | N. 60° E. | 80° N. N.W. | 3 ft. | Magnetic iron | Gray copper, iron pyrites | |
| **San Jose** | Near Los Bronces | Labrador porphyry | N. 27° E. | | 1½ ft. | Sulphate of baryta | Magnetic iron and iron pyrites | |
| **El Secorro** | Near Los Bronces | Labrador porphyry | N. 25° E. | | | | | |
| **Zaragoza** | Near Los Bronces | Labrador porphyry | N. 23° E. | | | Magnetic iron | | |
| **San Luis Gonzaga** | Near San Javier | Labrador porphyry | N. 30° W. | 30°–40° N.E. | 8 inches | White quartz | Galena, blende, mispickel, iron pyrites | |
| **La Colorada** | Near Los Bronces | Altered sandst. & slate (triassic) | N. 50° E. | 80° S. | 5 ft. | Iron ore and quartz | | |
| **Aguajito** | Near San Javier | Labrador porphyry | N. 24° E. | | | Magnetic iron | | |
| **Santa Edubigen** | La Barranca | Quartzite (triassic) | N. E.–S. W. | 30° N. W. | 2½ ft. | Quartz | | |
| **La Cuadra** | Near San Javier | Labrador porphyry | N. 10° W. | 20°–25° E. | 1 ft. | Quartz | Arsenical pyrites, blende, and galena | |
| **El Rosario** | Near San Javier | Labrador porphyry | N. 10° W. | 20°–25° E. | | Crystalline quartz | | |
| **El Escritorio** | Near San Javier | Labrador porphyry | N. W.–S. E. | N. E. | 1½ ft. | White quartz | | |
| **Santa Rosa** | Bet. Los Bronces and San Javier. | Quartzite (triassic) | N. 10° E | 55° S. | 3 ft. | Quartz and iron ore | Carbonate of lead, iron ore, galena, blende, iron pyrites | |
| **Soledad** | Candelero | Porphyry (metam.) | N. 55° E. | 85° S. E. | 30 ft. | Quartz | | $266.65 |
| **Carmen** | Candelero | Porphyry (metam.) | N. 85° E. | 85° N. | 28 ft. | Quartz | Silver and gold, sulph. of silver. | $186.65 |
| **Atocha** | Candelero | Porphyry (metam.) | N. 45° E. | 85° N. | 14 ft. | Quartz | Silver and gold, sulph. of silver. | $213.35 |
| **Rosario** | Candelero | Porphyry (metam.) | N. 50° E. | 70°–80° N W. | 17 ft. | | Silver and gold, sulph. of silver. | $160 |
| **Contrestaca** | Near La Puerta | Metamorphic rocks | N. 63° E. | 76° N. W. | | White quartz | Blende, galena, sulph. of silver | |
| **Descubridora** | Near La Puerta | Metamorphic rocks | N. 35° E. | 69° N. W. | | White quartz | Blende, galena, sulph. of silver | |
| **Soledad** | Bet. La Puerta and San Dimas. | Metamorphic rocks | N. 65° E. | Perp. | | White quartz | Blende, galena, sulph. of silver | |

## NORTHERN MINES OF MEXICO.—CONCLUDED.

| Mines. | Location. | Country. | Strike. | Dip. | Width. | Matrix. | Ores. | Yield. (Per Ton) |
|---|---|---|---|---|---|---|---|---|
| CANDELARIA | Near San Dimas | Porphyry (metam.) | N. 63° E. | 63° N. N. W. | | White quartz | | 1st class $3210<br>2d class $133 |
| BOLANOS | Near San Dimas | Porphyry (metam.) | N. 45° E. | 75° S. E. | 20 ft. | White quartz | Galena, blende, gold | |
| CINCO DE MAYO | Near Zaragoza | Syenitic granite | N. 52° E. | 75° N. W. | 4 ft. | White quartz | Galena, blende, iron pyrites, brittle silver glance, native silver | 1st class $800<br>2d class $180 |
| CINCO SEÑORES | Near Copála | Greenstone | N. 20° W. | 45° E. N. E. | 1 to 4 ft. | Quartz | Galena, blende, iron pyrites | |
| NAPOLEON | Near Copála | Greenstone | N. 10° W. | 80° E. | 2 to 8 ft. | Chalcedonic quartz. | Galena, blende, copper pyrites, etc. | |
| ROSARIO | Near Copála | Greenstone | N. 50° W. | 85° E. | | Chalcedonic quartz. | | |
| PATINO | Near Copála | Greenstone | N. 22° W. | Perp. | 4 ft. | Chalcedonic quartz. | Galena, blende, copper pyrites. | |
| HAVAL | A few leagues from Mazatlan. | Syenitic granite | N. 80° E. | 80° N. | | Quartz | Oxide of lead, native silver | |
| MINA GRANDE | Near San Marcial | Metamorphic slates (triassic) | N. and S. | 30° W. | 2 ft. | Quartz | Sulphuret of antimony, mispickel, copper pyrites, blende, iron pyrites | |
| LAS CRUZECITAS | Near San Marcial | Metamorphic slates (triassic) | N. 15° E. | 65° E. | 4½ ft. | Heavy spar | Tepustete with copper and iron pyrites, and gray copper ore | 1st cl. $90–100<br>2d cl. $35–40 |
| GUIJOSITA VIEJA | Near San Javier | Labrador porphyry | | | | Quartz | Galena, arsenical pyrites, blende, copper pyrites | |
| LA ANTIMONIA | Near San Javier | Labrador porphyry | | | | Crystalline quartz | Sulphuret of antimony and lead. | |
| DIOS PADRE | Trinidad | Labrador porphyry | | | 9 to 12 ft of ore | | Gray copper ore, galena, iron pyrites, native silver. | |
| AGUA GRANDE | 9 miles from San Marcial | Porphyry (volcanic) | N. 38°–40° E. | 80° N. W. | 1½ ft. | White quartz | Indigo copper, chrysocolla, chalkosine, chalcopyrite. | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **La Colorada** | Near Copála | Greenstone | N. and S. | 20° W. | 40 ft. | Chalcedonic quartz | | |
| **Algodona** | Near San Marcial | Metamorphic slates (triassic) | N. and S. | 30° W. | 8 inches | Rotten quartz and iron ore | Chlorobromide of silver | |
| **Los Bronces** | Los Bronces | Greenstone | E. of N. | 85° E. | | Heavy spar | Magnetic iron, gray copper, copper and iron pyrites | 1st class 350<br>2d class $40-60 |
| **La Prieta** | Los Bronces | Greenstone | N. 40° E. | 80° N. W. | | Heavy spar | Magnetic iron, gray copper, copper and iron pyrites | |
| **Alta Gracia** | Near San Antonio de la Huerta | Quartzite (triassic). | N. and S. | 30° E. | 4 ft. | Brown spar | Copper pyrites and gray copper | |
| **Rosario de Guadalupe** | San Javier | Greenstone | N. 70° E. | 60° S. S. E. | 2 ft. | Quartz | Black blende, iron pyrites and galena | |
| **Aurora** | Near Los Bronces | Greenstone | N. 10° E. | 45°-50° E. | 2 ft. | Magnetic iron | Gray copper ore and copper pyrites | |
| **El Taste** | Near San Javier | Greenstone | N. 15° E. | 50°-55° E. | 5 ft. | Quartz | Galena, blende, copper and iron pyrites (petanque) | $100 |
| **Providencia** | Near Tecoripa | Quartzite (triassic) | N. 10° E. | 65° E. | 1 ft. 2 in. | Quartz | | 1st class $200<br>2d cl. $35-40 |
| **La Bojorquesa** | Near Tecoripa | Quartzite (triassic) | N. 20° E. | 65° E. | | Quartz(ferruginous) | Black blende, iron pyrites, galena, copper pyrites | |
| **La Chipiosena** | Near Topisco | Granite | | | | | | |
| **Mina Prieta** | Near San Antonio de la Huerta | Quartzite (triassic) | | | | Brown spar | Copper pyrites, gray copper | |
| **El Tesoro** | Cacachilas | Granite | N. W.-S. E. | 75° S. W. | 4 ft. | | | 1st class $220<br>2d class $90 |
| **Rosario** | Canada de la Iglesia, near San Antonio. | Quartzite (triassic). | N. E.-S. W. | 85° N. W. | 2 ft. | | Galena and blende | $60 |
| **Babicanora** | | Limestone (carboniferous) | N. E.-S. W. | 75° N. W. | 5 ft. | Quartz | Galena, iron pyrites, fahlerz, ruby silver ore; gold and silver | $34.65 |

### Regular Meeting, March 19th, 1866.

President in the Chair.

Twelve members present.

Donations to the Cabinet: Sections of the *Sequoia gigantea* and a roll showing the annual growth of the "Old Maid," one of the trees in the Calaveras grove of Big Trees; from Mr. Henry Hentsch.

Mr. Dall stated that Dr. Cooper had discovered, in the vicinity of Santa Cruz, *Helix redemita*, *H. Vancouverensis*, *H. Columbiana*, and *H. arrosa;* also, in the small rivulets near the town, *Margaritana falcata*, besides several univalves, and also an undetermined *Helix*, which may prove to be new. Mr. Dall also remarked that Rev. J. Rowell had obtained at Hayward's, Alameda County, a number of specimens of *Helix Cronkhitei*, which is a new locality for that species.

Mr. Dall remarked that in dissecting a specimen of *Trochiscus Norrissii*, the position of which has for some time been doubtful, sufficient evidence was obtained to decide that it did not belong with the Proboscidians, to which group it had been doubtfully referred by several naturalists.

### Regular Meeting, April 2d, 1866.

Mr. Stearns in the Chair.

Five members present.

Mr. Bloomer presented some Diatoms, from the coast of California, supposed to belong to the genera *Melissa* and *Meridion;* they were both found growing upon calcareous sea weeds. The genus *Meridion* has not heretofore been recorded as occurring in California.

Mr. Dall presented, in the name of Dr. Cooper, the following paper:

## Description of a new California Helix, with notes on others already described.

BY J. G. COOPER, M.D.

### Helix (Arianta) sequoicola, Cooper.

Sp. ch. *H. testa* rotundata, umbilicata, spira depressa, anfr. ult. nonnunquam subangulata; anfr. vi ad vii et dimidium, perist. obliqua superne parum deflecta; labio tenui, reflexo, infra crassiore, acuta. Colore atrobrunnea, vel olivacea, zona nigra, lata, inter duabus ochraceis sita, in spira semicelata, labio albo; intus læte purpureo, zonis duabus albis. Epidermide nitente, infra polita, striis incrementis læve perspicuis, interdum tenuissime malleata, rugis spiralibus; supra punctis piliferis creberrime induta; pilis brevissimis junioris deciduis.

*Animal* schisto-colore; corpore cylindraceo rugosa, tentaculis longis, pede postice elongata, cuneata.

*Testæ* lat., major, 0.93 ad 1.20; minor 0.76 ad 0.96; alt. 0.42 ad 0.54. poll. Angl.

*Hab.* Santa Cruz, California, in ligno carioso, locis humidissimis.

*Specific characters.* Shell rounded, umbilicate, spire depressed, last whorl sometimes subangulate, whorls 6 to 6½. peristome oblique, little deflected above; labium thin, reflexed, thickest below; acute. Color dark brown or olivaceous, with a broad black band between two yellow ones, half hidden on the spire, lips white; within a fine purple with two white bands. Epidermis shining, polished below, the lines of growth faintly visible, sometimes very lightly malleated, and with spiral ridges; above with crowded scars bearing very short bristles in the young shell which fall off in the adult.

*Animal* slate colored, body cylindrical, rugose, tentacles moderate; foot elongated, behind wedge-shaped.

*Shell*—large diameter 0.96 to 1.20; smaller diameter 0.76 to 0.96; height 0.42 to 0.54 hundredths of an inch.

*Hab.* Santa Cruz, Cal., among decayed trees in the dampest places.

This beautiful species is quite rare, only three adult and twelve young specimens having been found after long searching. It will probably occur more commonly in some part of the redwood forests which I have been unable to explore. It approaches nearest to *H. Dupetithouarsi* and *H. fidelis*, being between them in form and size as well as colors, but the pilosity at once distinguishes it. Its distinct bands and rounded whorls separate it from *H. infumata* and *Hillebrandii*, the latter when perfect having also much longer hairs. The animal is lighter colored than those of *H. arrosa, Nickliniana, redimita, ramentosa, tudiculata,* (which are all very similar) but much darker than that of *Dupetithouarsi*, and I believe also of *fidelis* and *infumata*. The form of the shell is a link connecting these with *Mormonum*.

In the tabular arrangement adopted in my State Survey Report, it would come in as the pilose analogue of *H. Dupetithouarsi*, and *H. exarata*, which are also its nearest geographical neighbors, as follows:

| § **A.** Shining; band triple, not rugose, 1. whorls 6 to 8. | § **B.** Dark; hirsute in the young, 1. whorls 6 to 6½. | § **C.** Brown: band single, rugose, sculptured, 1. whorls 6 to 7. |
|---|---|---|
| H. fidelis.<br>H. Traskii.†<br>H. Dupetithouarsi. | H. infumata.*<br>H. sequoicola.<br>H. Hillebrandii. | H. arrosa.<br>H. exarata.<br>H. Ayresiana. |

Judging from the form of *H. Mormonum*, it is possible that the young will be found to be hirsute.

The table refered to includes twelve other banded species of California, arranged under the same headings. It is interesting to observe that the § A 1 and B 1 groups inhabit coniferous forests, and probably feed chiefly on fungi found in decaying wood while § C, including also H. *Nickliniana, Bridgesii, redimita, ramentosa, tudiculata, Californiensis* (and *Carpenteri ?*) are found in woods of oak, etc. Another group which I place in § A (as not being rugose) are found in dry, treeless localities where they seem to represent those last mentioned, the size, form, and number of whorls furnishing parallels, but being usually less in size, as might be expected of species from arid regions, and often with the band single or obscured; these are H. *Tryoni*†, *rufocincta, Kellettii, crebristriata, Gabbii, facta.*†

The bandless species, of which there are few on this coast, present analogous sections as to surface characters, and exhibit much greater varieties in the form of their apertures, by which they can be arranged in groups, having a greater development of species in the Atlantic States and more distinguishable by form than by surface.

*H. Townsendiana* alone approaches § C in its rugose sculpture, but otherwise differs greatly from the usual types of California.

From the shells alone, five subgenera may be established out of the banded group, which I will describe in a future article.

NOTE.—There is a single specimen of Helix in the State Collection, supposed to have been obtained in the Mount Diablo range by Prof. Brewer, which closely resembles the small form of *H. Sequoicola* in shape, but being nearly bleached is too imperfect to describe minutely, though very likely a new species.

It is remarkable for having seven whorls, while the former and *H. Mormonum* of the same size have but six; it is also less compressed than the latter, and the umbilicus is less covered. The color where remaining is shining gamboge yellow (faded?) with a *single* very narrow band *above* the middle, not showing the pale band on each side of it that is so marked in others of the group. The sculpture seems to have been very *slightly* malleated, and with the faint lines of growth cut by smooth depressed waved grooves transversely, and thus obliquely to the sutures (while those of *H. Traskii* are parallel).

---

* In this the band seems obscured in the general blackness of the shell; occasional varieties of several others are found without the band, as if from disease, as in *H. anachoreta*.

† These species have parallel spiral grooves, not *rugæ*.

Diam. maj. 0.95; alt. 0.40 inch.

A region so near San Francisco ought to furnish more and better specimens.

There is a form referred to *H. fidelis*, from Humboldt Bay, which may also prove a new species. It is entirely purplish black, *without bands*, the lips white inside, and differs from *infumata* chiefly in great elevation and thicker lips, having even the subcarinate body whorl of the latter, and the same number of whorls (6½). There is, however, no trace of bristle marks, and some specimens appear to connect it with *fidelis*, suggesting a possibility of its being a hybrid.

The State Collection contains one specimen, obtained from the late Dr. Frick.

Diam. maj. 1.24; min. 1.09; alt. 0.70 inch.

---

### Regular Meeting, April 16th, 1866.

President in the chair.

Five members present.

Mr. Horace F. Cutter was elected a Resident Member.

The Committee on rooms reported that two rooms had been hired for the Academy on the southeast corner of Montgomery and Sacramento streets.

---

### Regular Meeting, May 7th, 1866.

President in the chair.

Eight members present.

Mr. Harford presented some ivory nuts from Panama.

Dr. Gibbons made some remarks explanatory of a series of tables which he exhibited, showing the variations of rain fall at San Francisco, and their relation to the phases of the moon. He showed that the greatest amount of rain fell immediately before the time of full moon, and that, following the day of the full, the diminution in quantity was very rapid. The series of observations from which the tables were prepared extended over a period of fifteen years.

Dr. Gibbons remarked that he proposed continuing the investigation of the subject of the connection of the moon's phases with the fall of rain, and that he would prepare a paper on the subject.

Considerable discussion followed on the subject of the weather of this coast, in which nearly all the members present took part.

## Regular Meeting, May 21st, 1866.

Mr. Stearns in the chair.

The Academy met for the first time in its new rooms on the corner of Montgomery and Sacramento streets; twelve members were present.

Donations to the cabinet: Two boxes of shells, from the Smithsonian Institution.

Donations to the Library: Bulletins de l'Académie Royale des Sciences de Belgique (2)XVIII, XIX, 1864–5. Annuaire de l'Académie Royale de Belgique, 1865; 31$^{me}$ Année. Sitzungsberichte der königl. bayer. Akademie der Wissenschaften zu München, 1864, II, 3, 4; 1865, I, 1–4; II, 1–4. Annalen der königlichen Sternwarte bei München, Band XIV. Entstehung und Begriff der naturhistorischen Art, von Dr. Carl Nägeli, 2$^{te}$ auflage; München, 1865, 8vo. pamphlet. Induction and Deduction, von Justus von Liebig; München, 1865, 8vo. pamphlet. Vorträge über die Florenreiche, von Dr. C. F. Ph. von Martius; München, 1865, 8vo pamphlet. Elfter Bericht der Oberhessischen Gesellschaft für Natur- und Heilkunde; Giessen, 1865. Verslagen en Mededeelingen der koninklijke Akademie van Wetenschappen; Afdeeling Naturkunde, 17$^{de}$ Deel; Amsterdam, 1865: same; Afdeeling Letterkunde, 8$^{ste}$ Deel, 1865: same; Iarboek, 1863, 1864. Musee Vrolik, Catalogue de la Collection d' Anatomie, etc. de M. M. Ger. et W. Vrolik; 1 vol. 8vo. Amsterdam, 1865. Meteorologische Waarnemingen, 1864; 1 vol. long 4to Utrecht, 1865. Kongliga Svenska Vetenskaps-Akademiens Handlingar; Ny Följd, 5$^{te}$ Bandet, 1$^{sta}$ Häftet, 1863. Ofversigt of Kongl. Vetenskaps-Akademiens Förhandlingar, 21 $^{sta}$ Argangen;

1 vol. 8 vo. Stockholm, 1865. Meteorologiska Jaktagelser i Sverige, utgifna af Kongl. Svenska Vetenskaps-Akademien: 5$^{te}$ Bandet, 1863. Meteorologiske Jagttagelser paa Christiania Observatorium, 1864; Christiania, 1865. Meteorologische Beobachtungen, aufgezeichnet auf Christiania Observatorium; 1, Band, Letzte Lieferung, 1837–63, Christiania, 1865. Oversigt af Norges Echinodermer ved Dr. Michel Sars; 1 vol. 8vo Christiania, 1861. Zologisk-Botaniske Observationer fra Gudbrandsdalen og Dovre, af R. Collett; 8vo. pamphlet, Christiania, 1865. Beretning om en botanisk Reise i Valders, foretagen i Sommeren 1864, af H. C. Printz; 8vo. pamphlet, Christiana, 1865. Oversigt af Christiania Omegns ornithologiske Fauna, af R. Collett; 8vo. pamphlet, Christiania, 1864. Norges Ferskvandskrebsdyr: Förste afsnit, Branchiopoda, 1, Cladocera ctenopoda, af G. O. Sars; 4to pamphlet, Christiania, 1865. Hestiæ Planetæ Minoris XLVI, Elementa Nova, deduxit F. M. Karlinski, Cracoviæ, 1865. Jahrbücher des Vereins für Naturkunde im Herzogthum Nassau, 17$^{tes}$ and 18$^{tes}$ Heft, 1 vol. 8vo. Wiesbaden, 1862–3. Jahrbuch der k. k. geologischen Gesellchaft, 1865, Band XV 1, 2, 3. Der Zoologische Garten; VI Jahrgang, Nos. 1–12, 8vo. Frankfort a. m., 1865. Flora, oder allgemeine botanische Zeitung; Neue Reihe, XXIII Jahrgang, 8vo. Regensburg, 1865. Sitzungs-Berichte der naturw. Gesellschaft Isis zu Dresden; Jahrgang, 1864, 8vo. Dresden, 1865. Verhandlungen des naturhistorischen Vereins der preuss. Rheinlande und Westphalens; 21$^{ter}$ Jahrgang, 1 volume in two parts, 8vo. Bonn, 1864. Verhandlungen der k. k. zool-bot. Gesellschaft in Wien; XIV Band, 8vo. Wien, 1864. Mémoires de l'Académie Impériale des Sciences de St. Petersbourg; Tome V, 1, VII 1–7 (complete), VIII, 1–16 (complete), 4to, St. Petersburg, 1864–5. Bulletin de l'Académie Impériale des Sciences de St. Petersbourg; Tome VII, Feuilles 12–36, VIII 1–36. Royal Horticultural Society's Proceedings; vol. IV, No. 10, vol. V, Nos. 4–9, 8vo. London, 1865. Journal of the Royal Horticural Society; new series, vol. 1, part 1., 8vo. London, 1866. Defense des Colonies, III, par Joachim Barrande; 8vo. Prague, 1865. Fragmenta Phytographiæ Australiæ, F. Müller; vol. IV. 8vo, Melbourne, 1863–4. Vegetation of Chatham Islands, F. Müller, 8vo. Melbourne, 1864. Analytical drawings of Australian Mosses,

edited by F. Müller, 1 Fasicle, 8vo. Melbourne, 1864. Plants indigenous to the Colony of Victoria, Lithograms, by F. Müller, 4to, 1864–5. Review of American Birds in the Museum of the Smithsonian Institution, by S. F. Baird; Part 1, Middle and North America, 8vo. Washington. Illustrated Catalogue of the Museum of Comparative Zoology, No. II, North American Acalephæ, by A. Agassiz; 4to, Cambridge, 1865.

All of the above publications were presented by the authors or the Societies publishing the same; those published in Europe were forwarded and received through the medium of the Smithsonian Institution.

Mr. Dall presented the following paper:

## On a New Subfamily of Fluviatile Mollusca.

BY W. H. DALL, ACTING DIRECTOR SCI. CORPS, W. U. T. EX.

A paper was read by Dr. Isaac Lea, before the Philadelphia Academy of Natural Sciences, April 1st, 1856, in which he described a new genus (*Pompholyx*) and species (*P. effusa*, Lea) of fluviatile mollusca, from California. He placed it in the *Family* LYMNÆANA without remark.

In the "*Genera of Recent mollusca,*" by H. & A. Adams, it is referred to (Vol. II, p. 645, Pl. CXXXVIII, fig. 11) as the only species of the genus and is placed in the *Family* LIMNÆIDÆ.

It is not mentioned by Chenu, in the "*Manuel de Conchyliologie.*"

In the "*Supplementary Report to the British Association,*" by Dr. P. P. Carpenter (page 674), are given the views of Mr. W. G. Binney, one of the most eminent of American conchologists and particularly devoted to the Pulmonates. He places the mollusk in question, between the genera *Limnæa* and *Physa*, in the *Subfamily* LIMNÆINÆ, of the *Family* LIMNÆIDÆ.

Investigations as to the animal, however, suggest the propriety of separating it, if not (as a *Family Pompholidæ*) entirely from the *Family* LIMNÆIDÆ, at least in a subfamily by itself.

In the few specimens which I have been able to examine with regard to the dentition, the dried animal has not yielded very satisfactory results, and I do not, therefore, feel justified in entirely separating it until more is known.

In the following table, a West Coast species is given as a type of each genus:

### CLASS PULMONATA.

*Family* LIMNÆIDÆ, H. & A. Ads.
*Subfamily* LIMNÆINÆ, H. & A. Ads.

West Coast Genera :

**Limnæa,** Lam.

Subgenera :

*Limnæa,* Type *L. stagnalis,* Lin.
*Limnophysa,* Fitz., Type *L. palustris,* Müll.

**Physa,** Drap.

Subgenera :

*Physa,* Type *P. heterostropha,* Say.
*Bulinus,* H. & A. Ads., Type *B. hypnorum,* Lin.

*Subfamily* PLANORBINÆ.

W. C. Genera :

**Planorbis,** Guett.

Subgenera :

*Planorbis,* Type *P. subcrenatus,* Cpr.
*Helisoma,* Sw., Type *H. ammon,* Gld.
*Menetus,* H. & A. Ads., Type *M. opercularis,* Gld.

**Carinifex,** W. G. Binney.
Type *C. Newberryi,* Lea.

*Subfamily* ANCYLINÆ.

W. C. Genera :

**Ancylus,** Geoffr.
Type *A. Newberryi,* Lea.

**Acroloxus,** Beck.
Type *A. Nuttallii,* Lea.

**Gundlachia,** Pfr.
Type G. *Californica,* Rowell.

*Subfamily* POMPHOLINÆ, Dall.

*Testa depressa, paucis spiralis, anf. ult. maxima. Columella recta, sine plica. Animalis tentaculis longis, oculiferis, et alius par oculorum, in bases interiores tentaculorum.*

Characters, *Shell ;* depressed, few whorled, last whorl the largest, without fold on the columella. Inoperculate.

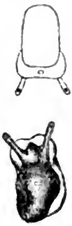
*Soft parts ;* foot rounded, tentacles long, bearing eyes ; another pair of eyes situated on the inner bases of the tentacles. Fluviatile, phytophagous.

### Genus **Pompholyx,** Lea.

Proc. Phil. Acad., Ap. 1st, 1856.

Type P. effusa Lea, sp. unica. [*Fig.* 28.]

FIG. 28.



*Shell;* small, swollen, with three whorls, the last much the largest. Above, rounded planulate, suture deep but not channelled. Below, not umbilicated, rounded convex. Aperture large, effuse, internally shining. Columella flattened, not folded; externally, in fresh specimens, greenish horn color; dead ones nearly white or waxy brown. Alt. 0.14 in., major diam. 0.2, min. diam. 0.16 in.

*Soft parts.* Foot rounded truncate, short, bluish-ash color, darker on the margin. Lips broad, semilunar. Tentacles long, eyebearing; tips pale yellow, eyes black; a second pair sessile on the inner bases of the tentacles. Body delicate brownish olive green; a light streak just behind and outside of base of each tentacle.

Localities: Sacramento River (Trask), Lea; Eagle Lake, Horn; Klamath Valley and Frazer Spring, Gabb.

I am indebted to Mr. Wm. M. Gabb, of the State Geological Survey, for notes and drawings, confirmatory of previous doubts in regard to this rare and interesting mollusk. They were taken from the living animal, and coming from a distinguished Palæontologist may be relied on as correct.

[N.B.—Through inadvertence in drawing, the shell is represented as reversed in the figure.]

Professor Whitney made some remarks on the geology of the State of Nevada, of which the following is an abstract.

Having recently received a small but very interesting collection of fossils, made in Nevada by Mr. J. E. Clayton, the examination of which has added considerably to our scanty stock of information in regard to the geology of an extensive region comprised between the meridians of 115° and 120°, and the parallels of 38° and 41°, I take this occasion to set forth, in a very concise manner, the information which I have collected, up to the present time, in regard to the age of the sedimentary formations of the regions in question.

The State of Nevada occupies a portion of the continent which, during the last few years, has received a large share of attention from the public and excited the greatest interest among scientific men; but where, up to the present time, detailed geological work has been impossible, owing to the absence of any geographical map of the State approaching even to accuracy.

The U. S. Pacific Railroad Surveys furnished no geological information whatever in regard to the territory embraced within the present area of the State of Nevada. The route from Salt Lake to Humboldt River, at Lassen's Meadows, was hastily explored by Captain Beckwith, in May, 1854, and he was accompanied by Mr. Schiel as Geologist; but no information of any value is given in regard to the geological structure of the region traversed by the party, nor were any fossils discovered, although portions of the rocks along their route have since been proved to be prolific in organic remains.

On all the geological maps of the whole territory of the United States which have been published up to the present time, the region west of the Rocky Mountains has been so misrepresented that it is quite impossible to trace any approximation, or first hinting, at either the age or the outline of the principal formations. On these maps the region lying between the Salt Lake and the Sierra Nevada is usually left uncolored, or vaguely designated as "metamorphic" with patches of "volcanic" and "desert quaternary" scattered through it at random.*

The first paper or publication issued, in which any definite information in regard to the geology of Nevada was given, was that of Messrs. Meek and Engelmann, published in the Proceedings of the Philadelphia Academy of Natural Sciences, for April, 1860. This paper gives the results of the examination by Mr. Meek, of the fossils obtained by Mr. H. Engelmann, who accompanied Capt. J. H. Simpson on his explorations of 1858–59, or what is generally known as "Simpson's Wagon Road Expedition." As the full report of this expedition has never been published, we have no other information in regard to the geology of the region traversed by Capt. Simpson's party than that given in the paper above alluded to. The route followed on this survey was one near the present Overland Stage Road, passing through a region then entirely uninhabited by white men, but now dotted with mining camps and even towns of considerable size—a region which has been proved to contain a large number of argentiferous veins, and where mining operations have been carried on most energetically and extensively during the last two or three years.

The localities of fossils mentioned by Messrs. Meek and Engelmann, and inincluded within the limits of Nevada, are as follows: Long. 114° 45′, Lat 39° 45′, near what is now called Egan Cañon, fragments of Trilobites, either of Upper Silurian or Devonian Age, and "closely resembling Hamilton Group Forms:"—Long. 115° 58′, Lat. 39° 33′, and Long. 115° 36′, Lat. 39° 30′; at these two localities, situated in what are now the Eureka and White Pine Mining Districts, a "group of fossils of decided Devonian type" was found. This group consisted of *Atrypa reticularis*, *A. aspera*, or a closely allied species, a small *Productus*,, and three new species of *Spirifer*. This is the most westerly point, on our territory, at which any fossils belonging to formations older than the Carboniferous have, up to the present time, been discovered, so far at least as any published record shows. Between Lon. 115° and 115° 30′ and Lat. 40° 10′ and 39° 20′, is a group or series of hills, trending nearly north and south, and made up "of light yellowish gray, more or less argillaceous and arenaceous subcrystalline limestones and slates." From these hills fossils were collected which are referred by Mr. Meek to the Upper Carboniferous series. Most of the species were new; among them were three species of *Productus*, two new species of *Spirifer*, and another apparently identical with *S. cameratus*; also, *Athyris subtilita* and a new species of *Chonetes* closely allied to *C. Verneuiliana*; these localities are near what is now known as Ruby Valley and Fort Ruby.

---

* On Professor Hall's Map "illustrating the general geological features of the country west of the Mississippi River," which accompanied Emory's Mexican Boundary Report, and was published in 1857, all of a broad central strip running along the parallel of 40° through the center of Nevada, is colored as "lava and other igneous rocks," while the western portion of the State has several broad belts of "Upper Carboniferous Limestone," running north and south across it from Walker's Lake to Goose Lake. So far as I know, no Carboniferous fossils have yet been found in that part of Nevada.

The above are all the localities of fossils, in Nevada, known to have been published up to this time, excepting those which have been described or noticed in the publications of the Geological Survey of California. Messrs. Meek and Engelmann state, at the end of their paper, that igneous rocks predominate west of the 116th degree of longitude as far as the Sierra Nevada, and that only a few traces of stratified rock were found in that district in none of which any organic remains were observed. The exploration of this region, supposed to be destitute of fossiliferous rocks, has proved, however, that it contains immense ranges of stratified beds which, in a considerable number of localities at least, are highly prolific in well preserved fossils.

As soon as the Humboldt mining region began to be resorted to by miners, which was in 1861 and 1862, fossils were discovered by several persons, who about the same time furnished us with collections of value and interest. The most important of these collections were those of Mr. Gorham Blake and of Mr. R. Homfray. The specimens obtained by these gentlemen, as well as others of the same age obtained by the Survey, near Dayton, Nevada, and also in Genesee Valley, California, were figured and described by Mr. Gabb in the first volume of the Palæontology of California, forming a part of the series of publications of the Geological Survey. The geological age of the formation is that of the Hallstadt Limestone of the Austrian Alps, or the Upper Trias, there being several species at the above cited localities which are identical with European species from this geological position, as determined by Mr. Gabb, and confirmed by Von Hauer, the eminent palæontologist of the Austrian Geological Survey.*

Since the publication of the Palæontology of California, Vol. I, our stock of information with regard to the range and extent of the Upper Trias, in Nevada, has been considerably increased by the explorations of members of the Survey, and other persons who have furnished us with specimens from their collections, or given us information as to the character of the rocks noticed by them on their lines of travel. We now know that the Triassic rocks occupy a broad belt of country extending from the 117th meridian west to the line dividing the States of Nevada and California, and lying between the parallels of 38° and 40° Within the area thus designated, Triassic fossils have been found at several localities, some of which are remarkable for the number and good state of preservation of the various species. Among these localities that of the Volcano District is remarkable for the size and beauty of the Ammonites found there. This is about thirty miles east of the south end of Walker's Lake. New Pass District, twenty miles west of Austin, is also a rich locality of Triassic fossils

---

* See Jahrbuch der K. K. Geologischen Reichsanstalt, 1865, page 233 of the Proceedings.

At two or three points within this Triassic area there are indications of the existence of fossiliferous rocks occupying a higher position than the Trias, and perhaps of Liassic Age; but the collections have not yet been sufficiently studied to justify a positive opinion on this point.

The sedimentary strata in this region are much broken up and metamorphosed by intrusive rocks, of which there is a great variety, granite being one of the most abundant. In the southern portion of the area designated above as including stratified rocks of Triassic age, a very large part of the surface is occupied by volcanic materials, apparently a continuation of the very recent volcanic masses near Mono Lake. Lava is said to be the predominating rock over the region to the southeast of Walker's Lake, and as far in that direction as the State line between Nevada and Arizona. The same is true of the region to the north and northwest of Humboldt River, where granitic and volcanic rocks are reported as occurring, and where, so far as known, no fossils have yet been obtained. This, however, is a region as yet but little explored, on account of the number and warlike disposition of the Indians.

Between the 116th and 117th meridians is a region of granitic and volcanic rocks, including two principal north and south ranges, and many spurs and side ranges. The Toiyabe range, in which are the mines of Austin, or the Reese River mines, and which is a little east of the 117th meridian, is mostly granitic. Stratified but highly metamorphosed rocks are said by Mr. Blatchley to occur on its east flank, a few miles south of Austin; these rocks contain fossils, which, however, are nearly obliterated by metamorphism. A box of these, forwarded some time since, has never been received, so that no positive statement can be made as to the age of the formation. From Mr. Blatchley's description of the forms observed by him, it would appear that we may have here rocks older than the Carboniferous.

East of the 116th meridian, our collections indicate the existence of a broad area covered chiefly by rocks of Carboniferous age, which seem to occupy most of the space between the 115th and 116th meridians. The most western locality of Carboniferous fossils known to us is that on the west side of Diamond Valley, about 70 miles east of Austin, and in lon. 116°. Here, in a dark, crystalline limestone, a variety of species have been obtained by Mr. Clayton, all in a poor state of preservation, but of which the Carboniferous age may be without difficulty made out. Among the genera represented at this locality are *Productus* — two species, one of which is *P. semireticulatus* — *Spirifer*, and *Fusulina*, probably *F. gracilis*, besides some indistinctly marked corals. The indications are that these beds are of Lower Carboniferous age. On the east side of Diamond Valley some imperfectly preserved corals have been found, probably Devonian, or possibly belonging to a still older group. The collections from the region included between the 115th and 116th meridians indicate the association of rocks of both Devonian and Carboniferous age in the outcrops. Here our collections do not enable us to do anything more than to corroborate the previously published statements of Messrs. Meek and Engelmann in regard to the age of the formations.

From the Silver Peak District, near lon. 117° 20′, and lat. 38°, an interesting collection of fossils has been brought by Mr. Clayton. The specimens are unfortunately in a very imperfect and fragmentary condition, but they contain the first trilobites which have been brought to our office from any of the Pacific States or Territories. The rock in which they occur is a dark yellowish brown limestone, with intercalated layers of light grey argillaceous shales. Some of them appear to belong to the genus *Dalmania*, and, if so, the formation is probably of Upper Silurian age, although possibly Devonian. The careful examination of the corals which have been obtained in this district by Mr. Clayton, and also by Mr. Blatchley, will probably throw some additional light on the geological position of these rocks.

---

## REGULAR MEETING, JUNE 4th, 1866.

President in the chair.

Eleven members were present.

The following named persons were elected Resident Members: C. R. King, Frederick Gutzkow, Theodore Blake, W. A. Goodyear, Charles Bonner, C. W. Lightner, Hugo Hochholzer, James T. Gardner.

Donations to the Cabinet: Copper Ore, from Yarrow mine, near Lexington, Santa Clara county, and Molybdenite, from Coloma, El Dorado county, from Mr. Hanks. Land, river, and marine shells collected in Central and South America by the late Thomas Bridges; presented by Mrs. Bridges. Two birds from Mr. Lorquin. A collection of Australian plants, from Dr. Ferdinand Müller. Lichens from Plover Bay, collected and presented by Mr. Dall.

Donations to the Library: Verhandlungen der kaiserlich en Leopoldino-Carolinischen deutschen Akademie der Naturforscher, Band XXXII, 1ste Abtheilung; 4to Dresden, 1865. Amtlicher Bericht uber die 39te Versammlung Deutscher Naturforscher und Aerzte in Giessen im September, 1864; 4to, Giessen, 1865. Jahrbuch der k. k. geolgischen Reichsanstalt; 1865, Band XV. No. 4, roy. 8vo. Wien. Nachrichten von der k. Gesellschaft und der Georg-Augusts-Universität, aus dem Jahre 1865; 12mo. Göttingen.

The above were presented by the different Societies named, and forwarded through the Smithsonian Institution.

Mr. Dall made some remarks on the shells which have been collected by various naturalists at and near Monterey.

He remarked that he himself had collected in two weeks no less than two hundred and nineteen species, which number, added to forty-four which have been previously reported as occurring there, but which he did not obtain, gives two hundred and sixty-three as the whole number of species of shells now known to have been found at Monterey.

Of these were previously obtained only to the south of Monterey, twenty-four; previously obtained only to the north of Monterey, forty-two; previously obtained to north and south, but not at Monterey, twenty-nine; previously obtained at Monterey, one hundred and one; not obtained by Mr. Dall, forty-four; new, or not reported, twenty-three.

Collections of shells are greatly needed from points between San Francisco and the mouth of the Columbia river, and also from points between San Diego and Cape St. Lucas, in order to determine questions of geographical distribution.

A curious fact was noticed in *Chiton scabra*, of Reeve, which, although belonging to a class of strictly marine animals, was observed clinging to the rocks beyond the reach, except in storms, of the highest spray. That it does not migrate is proved by the fact that, living in nooks and crevices of the rocks, it grows into the very form of the hole in which it lives.

Mr. Dall also mentioned that, having visited and thoroughly searched the original locality for *Helix Californiensis*, a small island off Point Cypress, accessible only at low tide, this species was found to be nearly exterminated. A letter received from Dr. Canfield of Monterey since the visit of Mr. Dall, confirms the fact of the extinction. This has been caused apparently by a large millipede, which exists in great numbers, and is extremely voracious.

Several of the shells found commonly at Monterey, are identical with others collected during the past season on the coast of Russian North America.

Professor Whitney made some remarks on the absence of the Northern Drift formation from the western coast of North America and from the interior of the continent, throughout the region to the southwest of the Missouri River.

The term "Northern Drift" is understood to include the masses of unstratified detrital materials and bolders which have been transported and distributed by some general cause independent, in a great degree, of the present conformation of the surface and of the direction of the existing river courses. The investigations of geologists have shown that the surface of Canada, New England, and the States north of the Ohio and north of the parallel of 39°, as far west as the Mississippi, and even for some distance beyond it in that direction, are covered by detrital materials which have been carried from the North towards the South, and often for a great distance and in immense masses.

The explorations of the Geological Survey of California have demonstrated however, that there is no true Northern Drift within the limits of this State. Our detrital materials, which often form deposits of great extent and thickness, are invariably found to have been dependent for their origin and present position on causes similar to those now in action, and to have been deposited on the flanks and at the bases of the nearest mountain ranges by currents of water rushing down their slopes. While we have abundant evidence of the former existence of extensive glaciers in the Sierra Nevada, there is no reason to suppose that this ice was to any extent an effective agent in the transportation of the superficial detritus now resting on the flanks of the mountains. The glaciers were confined to the most elevated portions of the mountains, and although the moraines which they have left as evidences of their former extension are often large and conspicuous, they are insignificant in comparison with the detrital masses formed by aqueous erosion. There is nothing anywhere in California which indicates a general glacial epoch during which ice covered the whole country and moved bodies of detritus over the surface, independently of its present configuration, as is seen throughout the Northeastern States.

The same condition of things prevails in Nevada and through Oregon, as far as explored by the members of the Survey. The detritus seems alway to be accumulated at the base of the mountains—gravel, bolders, and sand lying below and not far distant from the beds of rock of which these materials once formed a part, and from which they appear to have been detached by weathering and aqueous erosion.

From the observations of Messrs. Ashburner and Dall, it would appear that no evidences of Northern Drift have yet been detected on this Coast, even as far north as British Columbia or Russian America. Neither of these gentlemen has observed any indication of a transportation of drift materials from the north towards the south, or of any condition of things similar to that which must have existed in the Eastern States during the diluvial epoch.

On examining the published records of explorers in the central portion of the Continent, it will be noticed that there is strong reason to believe that the absence of the Northern drift formation is not peculiar to the States along the Pacific Coast; but that the whole region west of the Rocky Mountains is also destitute of any indications of a detrital formation moved over the surface in one direction by any great general cause. Judging from our present stock of evidence, I am inclined to draw the line which limits the Northern Drift formation on the south and west approximately from the mouth of the Ohio to the headwaters of the Saskatchewan River.

It is evident that these facts should be taken into account in theorizing on the origin and cause of the drift. If, as stated above, the transporting agent has been limited in its field of action to the eastern and northeastern portion of our Continent, the phenomenon is seen at once to have become, in a measure, a local one—at least much more local than has hitherto been usually assumed by those geologists who have adopted the glacier theory of the drift.

Professor Whitney remarked that he was particularly desirous of introducing the subject on this occasion, in order that he might have an opportunity of impressing on Mr. Dall, who is about to leave for the Northern Coast, on the Telegraph Expedition, the importance of making a thorough examination of the detrital formations and surface geology of the country he may traverse.

### REGULAR MEETING, JUNE 18th, 1866.

Mr. Stearns in the Chair.

Thirteen members present.

The following named gentlemen were elected Resident Members: Baron F. von Richthofen, E. B. Dorsey, W. W. Palmer, W. S. Keyes, M. L. Stangroom, J. T. Watkins, Jr., W. G. W. Harford, Louis Falkenau.

Mr. H. G. Bloomer stated that he had identified the plant commonly known as the Pepper Tree, as *Schinus mollis.*

Mr. W. H. Dall called attention to several errors in geography made in a short chapter on geographical distribution of marine forms, forming the conclusion of Agassiz' "Sea Side Studies in Natural History," recently published. The errors were in regard to the Coast of California.

Mr. Stearns mentioned that in an hour and a half at Baulines Bay he had collected about fifty species of mollusca.

Dr. Gibbons spoke of the progress of his observations on the connection of the phases of the moon and the weather. His remarks were followed by an animated discussion.

### REGULAR MEETING, JULY 2d, 1866.

President in the Chair.

Ten members present, and Dr. Hillebrand, of Honolulu, a visitor.

The following gentlemen were elected Resident Members: Vitus Wackenreuder, Sherman Day, Thomas Price, E. Wertheman.

c.

Donations to the Cabinet:

Ores from the Eureka Mine, Grass Valley, and from the Othello Mine, Pahranagat District, by Mr. Hanks; Steatite from Baulines, by Capt. Morgan; Fungi from timber in the mines of Nevada, by Mr. Ewer.

Donations to the Library:

Congressional Documents, from Hon. John Conness. Transactions of the Royal Society of Victoria, 1861–1864, vol. vi, 8vo., Melbourne, 1865; Fragmenta Phytographiæ Australiæ, Nos. xxxi–xxxiv, 8vo.; Third and Fourth Annual Reports of the Acclimatisation Society of Victoria, 2 8vo. pamphlets, Melbourne, 1864: from F. Müller, M.D.

Dr. Gibbons called attention to the experiments and deductions of Dr. Salisbury, of Ohio, in regard to malarial diseases and their supposed vegetable origin. A discussion followed, in which Drs. Behr and Blake took part.

Dr. Hillebrand gave an account of the Botanical Garden of Batavia. It contains, among other plants, two hundred and sixty-two species of Palms. He also gave an account of the introduction of the Cinchona, of various species, into India and Java.

### REGULAR MEETING, July 16th, 1866.

Mr. Stearns in the Chair.

Twelve members present, and Mr. J. S. Hittell and Dr. Macgowan as visitors.

Dr. P. Comrie was elected a Corresponding Member, and Dr. S. Pawlicki a Resident Member.

Donations to the Cabinet:

Land and Marine Shells from the East Indies and the Pacific Islands, by Dr. Eckel.

Mr. Stearns presented the following paper:

## List of Shells collected at Baulines Bay, California, June, 1866.

BY ROBT. E. C. STEARNS, CURATOR OF CONCHOLOGY, CAL. ACAD. NAT. SCIENCES.

The comparative scantiness of molluscan life in the immediate vicinity of San Francisco, and of the coast for many miles in a southerly direction, led me to believe that an exploration of the small bays to the north of the Golden Gate would reveal a very considerable increase both of species and individuals; accordingly, upon the 14th, 23d, and 24th of last June, I visited the small inlet known as Baulines Bay, and made an examination of the sandspit which makes out from its southerly shore, also the beach inside of and as far north as Duxbury reef, which latter connects with the coast at a point about a mile above the entrance to the bay. The unfavorable condition of the tides prevented an exploration of the reef; as most of the specimens were obtained from the drift, without doubt the following list can be largely increased by a more thorough examination of the locality, especially the reef, at extreme low water and at different seasons of the year.

All of the specimens were in a condition sufficiently perfect to make identification easy; a few forms, of which I had some doubt, were submitted to Dr. J. G. Cooper.

1. Zirphea crispata, Linn.*
2. Pholadidea ovoidea, Gould.
3. Parapholas Californica, Conr.*
4. Saxicava pholadis, Linn.
5. Platyodon cancellatus, Conr.
6. Cryptomya Californica, Conr.
7. Schizothærus Nuttalli, Conr.
8. Clidiophora punctata, Conr.†
9. Solen sicarius, Gould.*
10. Machæra patula, Dixon.
11. Macoma secta, Conr.
12. Macoma var. edulis, Nutt.
13. Macoma nasuta, Conr.
14. Tellina Bodegensis, Hds.
15. Semele rubro-lineata, auct. non Conr.*
16. Tapes staminea, Conr.
17. Tapes var. diversa, Sby.
18. Tapes var. ruderata, Desh.
19. Saxidomus aratus, Gould.
20. Petricola carditoides, Conr.
21. Rupellaria lamellifera, Conr.*
22. Chama exogyra, Conr.*
23. Cardium corbis, Mart.
24. Lazaria sub-quadrata, Carp.
25. Mytilus Californianus, Conr.
26. Mytilus edulis, Linn.
27. Adula stylina, Carp.†
28. Pecten hastatus, Sby.*
29. Hinnites giganteus, Gray.
30. Placunanomia macroschisma, — Desh.†
31. Cryptochiton Stelleri, Midd.
32. Tonicia lineata, Wood.*
33. Mopalia muscosa, Gould.
34. Mopalia vespertina, Gould.*
35. Trachydermon Nuttallii, Carp.
36. Nacella insessa, Hds.
37. Nacella instabilis, Gould.*
38. Nacella ? var. triangularis, Carp.†
39. Acmæa persona, Esch.
40. Acmæa spectrum, Rve.
41. Acmæa pelta, Esch.
42. Acmæa var. asmi, Midd.
43. Acmæa patina, Esch.
44. Acmæa scabra, Rve. (var.)

45. Scurria mitra, Esch.
46. Clypidella (bimaculata, Dall, ms.)*
47. Glyphis aspera, Esch.
48. Glyphis densiclathrata, Rve.
49. Haliotis rufescens, Swains.*
50. Chlorostoma funebrale, A. Ad.
51. Chlorostoma brunneum, Phil.
52. Chlorostoma Pfeifferi, Phil.
53. Calliostoma costatum, Mart.†
54. Phorcus pulligo, Mart.
55. Margarita acuticostata, Carp.*
56. Crepidula adunca, Sby.
57. Hipponyx cranioides, Carp.
58. Cerithidea sacrata, Gould.
59. Bittium filosum, Gould.
60. Bittium armillatum, Carp.*
61. Littorina scutulata, Gould.
62. Lacuna unifasciata, Carp.
63. Lacuna solidula, Lov.
64. Scalaria indianorum, Carp.
65. Opalia borealis, Gould.†
66. Lunatia Lewisii, Gould*
67. Olivella biplicata, Sby.
68. Olivella intorta, Carp.
69. Nassa fossata, Gould.
70. Nassa mendica, Gould.
71. Nassa Cooperi, Fbs.*
72. Amycla carinata, Hds.
73. Amphissa corrugata, Rve.
74. Purpura crispata, Chem, (smooth var.)
75. Purpura var. ostrina, Gould.
76. Monoceras engonatum, Conr.
77. Ocinebra lurida, Midd.
78. Ocinebra var. aspera, Baird.
79. Ocinebra var. munda, Carp.
80. Ocinebra interfossa, Carp.
81. Cerastoma foliatum, Gmel.
82. Cerastoma Nuttallii, Conr.*
83. (?) Muricidea Californica, Hinds.*
84. Chrysodomus dirus, Rve.

Of No. 8, two odd valves, and of No. 9, a single perfect specimen on sand-spit; 15, an odd valve, one perfect specimen found by Col. Jewett, who accompanied me; 49, one specimen; (I am informed by the residents of the town that this species is abundant at a point about ten miles up the coast); 50 and 51, very common (young specimens frequently and mature shells sometimes umbilicated); 68, frequent; a well-marked species; (often confounded with the young shells of 67; the young shells of 67 are sometimes adorned with zigzag brown markings upon a light ground, otherwise, no resemblance between them; 68 is in shape between 67 and *O. bœtica*, of Carpenter); 71 is but an extreme form of 70, as I am convinced by an examination of not less than one thousand specimens, received by me from Monterey; 72—if "*gausapata*" and "*Californiana*" belong to "*Amycla*," this certainly should be placed with them; 76, particularly abundant (some 2000 living specimens collected; June 23d, this species had just commenced depositing their pink-tinted eggs, a few of which were obtained); 83, the immature shells of this species closely resemble some specimens of 78.

Professor Whitney exhibited a portion of a human skull recently deposited at the office of the State Geological Survey, by Dr. Thomas Jones, of Murphy's Camp, Calaveras County. He read the following:

---

Species marked with a * one specimen; thus † two specimens; of the remainder from three specimens upwards were collected.

## Notice of a Human Skull, recently taken from a Shaft near Angel's, Calaveras County.

BY J. D. WHITNEY.

This skull was taken from a shaft sunk on a mining claim at Altaville, near Angel's, in Calaveras County, by Mr. James Matson. By him it was given to Mr. Scribner, of Angel's, and by Mr. Scribner to Dr. Jones. Mr. Matson states that the skull was found at a depth of about one hundred and thirty feet, in a bed of gravel five feet in thickness, above which are four beds of consolidated volcanic ash, locally known as "lava"; these volcanic beds are separated from each other by layers of gravel, and Mr. Matson gives the following as the section of the various deposits passed through in sinking the shaft, which is one hundred and fifty-three feet deep, to the bed rock:

| | | |
|---|---|---|
| 1. | Black lava | 40 feet. |
| 2. | Gravel | 3 " |
| 3. | Light lava | 30 " |
| 4. | Gravel | 5 " |
| 5. | Light lava | 15 " |
| 6. | Gravel | 25 " |
| 7. | Dark brown lava | 9 " |
| 8. | Gravel | 5 " |
| 9. | Red lava | 4 " |
| 10. | Red Gravel | 17 " |
| | | 153 feet. |

The skull was found, according to Mr. Matson, in bed number 8, just above the lowest stratum of lava. With the skull were found fragments of silicified wood, the whole being covered and partly incrusted with stony matter, so that the fact of its being a skull was not recognized until after it had passed into Mr. Scribner's hands, by whom it was cleaned and presented to Dr. Jones.

The skull is said by Mr. Matson to have been taken from the shaft February 25th, 1866, and it came into my hands in the July following, when I immediately proceeded to the locality; but found the shaft temporarily abandoned and partly filled with water, so that it was impossible at that time to make any farther search in the bed from which the skull was procured. A careful inquiry into all the circumstances of the alleged discovery, and an interview with all the persons who had been in any way connected with it, impressed upon my mind the conviction that the facts were as stated above, and that there was every reason to believe that the skull really came from the position assigned to it by Mr. Matson. Still, as it is evidently highly desirable that as large an amount of evidence as possible should be accumulated in regard to a discovery of so much importance, I made arrangements that I should be notified whenever the shaft was reopened and the water taken out, and hope at a future meeting to be able to lay before the Academy the results of a personal examination of this interesting locality, and of further excavations in the bed from which the skull was taken.

Assuming the correctness of Mr. Matson's statements, this relic of human antiquity is easily seen to be an object of the greatest interest to the ethnologist as well as the geologist. The previous investigations of the Geological Survey have clearly demonstrated the fact that man was contemporaneous with the mastodon and elephant, since the works of his hands have been repeatedly found in such connection with the bones of these animals that it would be impossible to account for the facts observed on any other theory. (See Geology of California, Vol. I, p. 252.) But in the case of the skull now laid before the Academy, the geological position to which it must be assigned is, apparently, still lower than that of the mastodon, since the remains of this animal, as well as the elephant, which are so abundantly scattered over this State, are always (so far as our observations yet extend) limited in their position to the superficial deposits, and have never been found at any considerable depth below the surface. There is every reason to believe that these great proboscidians lived at a very recent date, (geologically speaking) and posterior to the epoch of the existence of glaciers in the Sierra Nevada, and also after the close of the period of activity of the now extinct volcanoes of that great chain. In fact, they belong to the present epoch. The bed, on the other hand, in which this skull was found, must have been deposited at a time when the volcanoes of the Sierra were still in vigorous action, and, as seems to us highly probable from a careful consideration of the geological structure of the region, previous to the glacial epoch of the Sierra, and also previous to the erosion of the cañons of the present rivers. No pains will be spared, however, to investigate all the conditions of the occurrence of this skull, and they will be fully reported on at a future time.

The portions of the skull which are preserved are, the frontal bone, the nasal bone, the superior maxillary bone of the right side, the malar bones, a part of the temporal bone of the left side, with the mastoid process and the zygomatic process, and the whole of the orbits of both eyes. The base of the skull is embedded in a mass of bone breccia and small pebbles of volcanic rock, incrusted with a thin layer of carbonate of lime, which appears once to have extended over the whole surface of the skull and of which a considerable portion still remains, the rest having been removed apparently in the process of cleaning. Under the malar bone of the left side, a snail shell is lodged, and partly concealed by the breccia of bone wedged in the cavity. This shell is the *Helix Mormonum*, according to Dr. Cooper, a species now living in the region where the skull was obtained. Although not competent to express a decided opinion on the subject of the ethnological relations of this skull, I should suppose that it belonged to the type of the Indians now inhabiting the foot-hills of the Sierra. It is certain that the facial angle is not one indicating a low order of intellect. The skull, however, seems to have been very thick and solid. It will be placed in the hands of competent craniologists for examination and description, as soon as reliable information has been obtained with regard to its occurrence, or whenever all has been ascertained that can be.

Dr. Macgowan made some remarks on the occurrence of earthquakes on the coast of China. He stated that, since the historic period, no great damage has been done by them.

Dr. Kellogg stated, that on a trip from San Rafael to Baulines Bay he had discovered a species of oak said to be equal to the live-oak for ship building.

---

## REGULAR MEETING, AUGUST 6th, 1866.

President in the chair.

Twenty members present.

Dr. D. J. Macgowan was elected a Corresponding Member.

Dr. Behr presented the following paper:

### Enumeration of the Californian species of Lycæna.

BY H. BEHR, M.D.

The genus *Lycæna* is much more extensively represented in California than in the Atlantic States, where, with the exception of a few Arctic species, only the most cosmopolitan types are represented, such as that of *Argiolus* and that of *Amyntas.*

California has about the same number of species as a corresponding area in the Mediterranean basin. The species are never identical with gerontogeic forms; but there is scarcely a single European type that does not find its analogue on the Pacific coast: a circumstance of which the celebrated lepidopterologist, Dr. Boisduval, has made good use in naming many Californian species with reference to the best known European species of the same type, thus:

| *Europe.* | *California.* |
|---|---|
| Pheretes, | Pheres. |
| Acis, | Antiacis, |
| Aegon, | Antægon, |
| Icarius, | Icarioides. |

1. *Lycæna Pardalis,* Behr.

Alæ ♂ ris superne omnes cæruleæ, marginem versus fuscescentes, limbo albido cinctæ.

Alæ ♀ næ superne omnino fuscæ, marginem versus magis obscuræ, anticæ linea discoidali instructae.

Alæ subtus cinereæ, linea discoidali serieque punctorum atrorum, halone parum distincto cinctorum signatæ. Posticæ marginem versus lunulas exhibent pallidiores quam puncta seriei et lineæ discoidalis.

This species is the only Californian yet known that approaches the type of the European species *L. Arion*, *L. Euphemus*, *L. Iolas*, *L. Alcon*, *L. Erebus*. It approaches most nearly to *L. Alcon* of Europe, and is intermediate between that and the European *L. Acis*.

The only habitat of this species yet known to me, is in the Contra Costa Coast Range, in the vicinity of San Antonio, where it frequents steep, grassy hill-sides. It is found at the end of May and beginning of June, and is rather rare.

2. *L. Antiacis*, Boisd. May. Different localities.

3. *L. Xerxes*, Boisd. May. Lone Mountain, near San Francisco; rather rare.

There exists no European analogue to this very peculiar type.

4. *L. Piasus*, Boisd. Very common throughout middle California. It replaces the Atlantic *L. Pseudargiolus*, and *L. neglecta*, Edw., as well as the European *L. Argiolus*; and belongs to one of the most cosmopolitan types of the genus. The caterpillar feeds on the flowers of the *Pavia*, unlike its European representative, which feeds on the leaves of *Rhamnus frangula*.

5. *L. Pheres*, Boisd. May and June. Lone Mountain, near San Francisco. I do not know of any other locality.

6. *L. Heteronea*, Boisd. Several localities. May and June. Likes to repose on *Eriogonum*, and is only to be found where some species of this genus is abundant. Probably the caterpillar feeds on the flower of this plant. This species is a very fine analogue of the *L. Daphnis* of Europe.

7. *L. Lorquini*, Behr.

Alæ ♂ ris et ♀ næ superne fuscæ, a radice ultra medium pruina cærulea obtectæ, limbo tessellato Alæ ♀ næ vitta marginali pallide fulvescenti instructæ.

Alæ subtus cinereæ, anticæ puncto duplici radicali, linea discoidali serieque punctorum necnon lunulis marginalibus instructæ; posticæ macula alba pro linea discoidali signatæ vittaque alba quæ occupat spatium inter seriem punctorum et lunulas marginales.

I possess a pair of this *Lycæna*, through the kindness of our celebrated entomologist, Mr. Lorquin, who caught the species in the higher Sierra Nevada.

8. *L. Icarioides*, Boisd. May and June, Marin County.

9. *L. Dædalus*, Behr.

Icarioidi similis sed subtus, quæ puncta in Icarioide sunt rotundissima, in Dædalo sunt transverse producta, lineaque discoidalis alarum posticarum, quæ in Icarioide deest et pro qua macula alba subtriquetra militat, hac in specie linea transversa distinctissime nigra vindicatur.

The three specimens in my collection, I received through the kindness of Mr. Chas. Hoffman, of the Geological Survey, who collected them in the Alpine regions around the head waters of the Tuolumne River.

10. *L. Sæpiolus*, Boisd.

11. *L. Achaja*, Behr.

Alæ utriusque sexus supra fuscæ, margine lineaque discoidali nigriscente, vittaque fulva marginali signatæ ♀ næ magis obscuræ.

Alæ subtus cinereæ, linea discoidali serieque punctorum nigrorum dilutius cinctorum refracta signatæ. Posticæ punctis tribus nigris dilutius cinctis radicalibus insuper instructæ. Lunularum series duplex, interior nigra exterior dilutior, apicem versus analem puncta nonnulla aurantiaca amplectens.

This species I received also from Mr. Hoffmann, who found it associated with *L. Dædalus*. It is the Californian analogue of the European *Agestis*, and produces on one somewhat the impression of a Polyommatus.

12. *L. Cilla*, Behr.

Alæ ♂ supra argenteo glaucæ, anticæ margine fusca lata, posticæ angusta instructæ; anticæ linea discoidali posticæ serie punctorum marginali, cui intus lunulæ submarginales præcedunt signatæ. Limbus subtessellatus.

Alæ ♀ næ fuscæ æque ac ♂ ris signatæ. Limbus distincte tessellatus.

Alæ ♂ ris anticæ subtus albidæ linea discoidali, serie punctorum necnon puncto radicali duplici ornatæ; lunulæ marginales duplices; posticæ a radice ad seriem punctorum cinereæ, punctis tribus radicalibus, serieque punctorum nigrorum lactea cinctorum maculaque discoidali lactea ornatæ; a serie punctorum usque ad marginem alæ posticæ lacteæ, serie lunularum duplici versus angulum analem luteo tincta instructæ.

♀ næ alæ subtus æque signatæ ac ♂ ris sed anticæ æque ad posticæ dimidiatæ et quæ pars est cinerea in ♂ colore fusco obtegitur.

This species I also received from the Geological Survey. It was found at an elevation of 11,000 feet and over, on the snowy heights surrounding the headwaters of the Tuolumne River. It belongs to the type of the European *Orbitulus*, which is found in similar regions of the Alps.

13. *L. Argyrotoxus*, Behr.

Alæ ♂ cinctæ supra lilacinæ fusco marginatæ albo limbatæ, ♂ næ supra fuscæ, in anticis fascia in posticis lunulis marginalibus fulvis signatæ.

Alæ ♂ ris subtus albidæ, ♂ næ lacteæ. Linea discoidalis parum distincta. Series punctorum vix halone cinctorum in anticis stricta, in posticis refracta. Pars radicalis anticarum concolor, posticarum nonnullis punctis minimis sed distincte halone cinctis signata; lunularum series marginalium duplex sed parum distincta, spatia fulva amplectens, quæ tamen non semper distingui possunt, in posticis lunulæ exteriores seriei splendore metallico micantes.

Alæ ♀ næ subtus magis distincte signatæ; spatia fulva submarginalia nec non splendor metallicus lunularum distinctius videtur.

This species is found in the Sierra Nevada. It is very similar to *L. Scudderi* of the Atlantic coast, and may prove to be only a local variety of that species, from which it differs chiefly in the shape and arrangement of the submarginal markings, which, however, in the Atlantic coast specimens, are much more distinct than in those from California.

14. *L. Calchas.*

♂? Alæ ♀ næ supra fuscæ radicem versus pruina cærulea abductæ, anticæ linea discoidali, posticæ punctis marginalibus nigrescentibus, lunulisque submarginalibus fulvis signatæ.

Alæ subtus cinereæ, linea discoidali, serieque punctorum quadrangularium albo marginatorum signatæ. Lunularum series submarginalis duplex, lunulas fulvas includens, in posticis intus triangulis albis suffulta. Lunulas marginales in posticis metallice micant.

Of this species I possess only one specimen; but this differs so much from the other California Lycænæ, that I consider myself justified in giving a diagnosis of it, although, as a rule, descriptions of Lepidoptera belonging to complicated and difficult groups should not be given without ample material on which to base them.

This specimen is from Mono Lake, and was collected by the Geological Survey.

15. *L. Battoides.*

Alæ ♂ ris supra azureæ, late nigro marginatæ tessellato limbatæ, ♀ næ fuscæ, posticæ lunulis nonnullis fulvis submarginalibus instructæ, omnium limbus tessellatus.

Alæ utriusque sexus subtus albidæ, punctis radicalibus duobus, in anticis in fasciam transversam valde refractam nigram confluentibus, linea discoidali, serie punctorum ordinariorum quadrangularium nigrorum, duplici serie submarginali, necnon margine nigro instructæ. Alæ posticæ tribus punctis radicalibus nigris et ad seriem punctorum submarginalium internam fascia fulva ornatæ, quæ nec seriem punctorum externam neque apicem anteriorem attingit.

This species was collected at an elevation of eleven thousand feet, on the head-waters of the San Joaquin River, by the Geological Survey. It represents the European *L. Battus.*

16. *L. Enoptes*, Boisd. Hills near the Mission Dolores, and in the San Bruno Hills. This species is rather rare. It represents the European *L. Aegon.*

17. *L. Antægon*, Boisd. The most common species near San Francisco, and found nearly everywhere through Central California. There are several generations succeeding each other through the year. A specimen I received from the head-waters of the San Joaquin River differs somewhat from this; but as I have only one of this variety, I will not venture to express a decided opinion in regard to it. It is, perhaps, an Alpine variety, and corresponding with a similar one of *L. Sæpiolus*, of which I received several specimens forming a series of transitions from the common type.

18. There is a species approaching the European *L. Agestis*, and which I received from the head-waters of the San Joaquin River; but the specimens in my possession are too imperfect to allow of an accurate description being given.

19. *L. Amyntula*, Boisd. From the Contra Costa hills, where, in May and

June, it frequents the flowers of the Pavia, on which the caterpillar probably feeds, as does that of *L. Piasus*.

20. *L. exilis*, Boisd. This species is rare, and so small that it might easily be overlooked. It frequents low meadows and salt marshes, where it loves to repose on the succulent stems of Salicornia, and on the flowers of Frankenia. At present it seems to be the only Californian representative of *L. Telicanus* and *Boeticus* of Europe; but I think that several species of this type will be found in Southern California, when that part of the State has been better examined. I have a specimen of *L. exilis*, collected by Baron de Terloo, in the Sierra Madre, between Mazatlan and Durango; and I received, from the same gentleman, several species of the same type from that locality.

It is this type which is so numerously represented in the tropical regions of the old world, and also in extra-tropical Australia. Our depauperated species, *L. exilis*, with its two European congeners, are, so far as I know, the only ones of this type which are found in the northern hemisphere beyond the tropics.

All the other Californian species belong to types of the temperate zone, and are such as are rarely met with in tropical countries, or in the southern hemisphere even out of the tropics. The type of *Amyntula* is the only one which has a series of species in tropical Asia; but, as far as I know, none in tropical America. The type of *Piasus*, also, has some representatives in the tropics of both continents, one of them being even identified with a species of Southern Europe.

As to the other types, these species are essentially endemic; and even among the Arctic species there seems not to be any amphigeic one. As the males vary very little, and the females only on their upper side, there is little difficulty in transcribing and recognizing them. If among our species there is any one which is identical with an Atlantic one, it is probably Argyrotoxus, which may be a local modification of *L. Scudderi*, Edw.

Mr. Stearns read the following paper:

## List of Shells collected at Santa Barbara and San Diego by Mr. J. Hepburn, in February-March, 1866.

### WITH REMARKS UPON SOME OF THE SPECIES,

BY ROBT. E. C. STEARNS, CURATOR OF CONCHOLOGY, CAL. ACAD. NAT. SCIENCES.

Through the kindness of Mr. Hepburn, well known as an enthusiastic and intelligent collector, I have been permitted to examine the collections made by him at the localities referred to, from which I have compiled the following list.

The remarks in connection with a few of the species are not wholly based upon the specimens obtained by Mr. Hepburn, but rather upon specimens received by me from various sources, and forming a portion of my private collection.

The figures in the left hand column refer to the numbers in Mr. P. P. Carpenter's Supplementary Report (1863) to the British Association.

12. Pholadidea penita; San Diego.
13. Pholadidea ovoidea, Gld.; Santa Barbara.
17. Saxicava pholadis, Linn.; Santa Barbara.
20. Platyodon cancellatus. Conr.; Santa Barbara.
21. Cryptomya Californica, Conr.; San Diego and Santa Barbara.
22. Schizothærus Nuttallii, Conr.; Santa Barbara.
35. Mytilimeria Nuttallii, Conr.; Santa Barbara.
43. Macoma secta, Conr.; San Diego.
54. Tellina Bodegensis, Hinds.; San Diego and Santa Barbara.
59. Semele decisa, Conr.; San Diego.
64. Cumingia Californica, Conr.; Santa Barbara.
65. Donax Californicus, Conr.; San Diego.
74. Amiantis callosa, Conr.; San Diego.
75. Pachydesma crassatelloides, Conr.; San Diego.
77. Psephis Lordi, Baird; San Diego.
81. Chione succincta, Val.; San Diego.
82. Chione excavata, Carp.; San Diego.
84. Chione fluctifragra, Sby.; San Diego.
85. Tapes tenerrima, Carp.; Santa Barbara.
88. Saxidomus aratus, Gld.; San Diego and Santa Barbara.
93. Petricola carditoides, Conr.; San Diego and Santa Barbara.
97. Cardium corbis, Mart.; Santa Barbara.
103. Liocardium elatum, Sby.; San Diego.
110. Lazaria subquadrata, Carp.; Santa Barbara.
112. Lucina Californica, Conr.: Santa Barbara.
118. Diplodonta orbella, Gld.; San Diego.
119. Kellia Laperouseii, Desh.; Santa Barbara.
134. Adula falcata, Gld.; Santa Barbara.
?160. Pecten ventricosus, Sby.; San Diego.
162*b*. Pecten latiauratus, Conr.; San Diego and Santa Barbara.
162. Pecten monotimeris, Conr.; Santa Barbara.
165. Hinnites giganteus, Gray; Santa Barbara.
166*c*. Ostrea var rufoides, Gld.
171. Bulla nebulosa, Gld.; San Diego and Santa Barbara.
175. Haminea virescens, Sby.; San Diego.
199. Melampus olivaceus, Carp.; San Diego.
243. Acmæa patina, Esch.; Santa Barbara.
247. Acmæa spectrum, Rve.; San Diego and Santa Barbara.
245. Acmæa persona, Esch.; Santa Barbara.
Nacella vernalis, (Dall Ms.); Santa Barbara.
249. Lottia gigantea, Gray; Santa Barbara.
250. Scurria mitra, Esch.; Santa Barbara.
252. Rowellia radiata, Cooper; Santa Barbara.
253. Fissurella volcano, Rve.; San Diego and Santa Barbara.
261. Haliotis splendens, Rve.; San Diego.

265. Phasianella compta, Gld.; San Diego.
266. Pomaulax undosus, Wood; Santa Barbara.
269. Leptothyra sanguinea, Carp.; Santa Barbara.
275. Trochiscus Norrissii, Sby.; Santa Barbara.
277. Chlorostoma funebrale, A. Ad.; Santa Barbara.
279. Chlorostoma brunneum, Phil.; Santa Barbara.
281. Chlorostoma aureotinctum, Fbs.; Santa Barbara.
282. Omphalius fuscescens, Phil.; San Diego.
283. Calliostoma canaliculatum, Mart.; San Diego and Santa Barbara.
305. Crucibulum spinosum, Sby.; San Diego.
†306. Crepidula aculeata, Gmel.; Santa Barbara.
†307. —— ? dorsata, Brod.; Santa Barbara.
†308. —— excavata, Brod.; Santa Barbara.
†311. —— navicelloides, Nutt.; Santa Barbara.
†311. —— var. nummaria, Gld.; Santa Barbara.
†311. —— var. explanata, Gld.; Santa Barbara.
†314. Hipponyx cranioides, Carp.; Santa Barbara.
328. Cerithidea sacrata, Gld.; San Diego and Santa Barbara.
329. Bittium filosum, Gld.; Santa Barbara.
329*b*. —— var. esuriens, Carp.; Santa Barbara.
333. —— armillatum, Carp.; Santa Barbara.
337. Littorina scutulata, Gld.; Santa Barbara.
366. Trivia Californica, Gray; Santa Barbara.
367. —— Solandri, Gray; Santa Barbara.
368. Erato vitellina, Hinds; Santa Barbara.
371. Drillia inermis, Hds.; San Diego and Santa Barbara.
374. Drillia torosa, Carp.; Santa Barbara.
388. Conus Californicus, Hds.; Santa Barbara.
409. Scalaria Indianorum, Carp.; San Diego.
424. Cerithiopsis assimilata, C. B. Ad.; Santa Barbara.
436. Ranella Californica, Hds.; Santa Barbara.
**A** Surcula Carpenteriana, Gabb.; Santa Barbara.
437. Mitra maura, Swains; Santa Barbara.
442. Volvarina varia, Sby.; Santa Barbara.
443. Olivella biplicata, Sby.; San Diego and Santa Barbara.
444. —— bœtica, Carp.; San Diego.
445. Nassa fossata, Gld.; Santa Barbara.
446. —— perpinguis, Hds.; San Diego and Santa Barbara.
448. —— mendica, Gld.; Santa Barbara.
449. —— Cooperi, Fbs.; Santa Barbara.
450. —— tegula, Rve.; San Diego.
457. Amycla carinata, Hds.; Santa Barbara.
456. Amphissa corrugata, Rve.; Santa Barbara.

---

† Compared and agree with Smithsonian Inst. types in Cal. Acad. Collection.

460*d*. Purpura saxicola, Val., var. ostrina, Gld.; Santa Barbara.
Purpura triserialis, Blainv.; Santa Barbara.
461. Monoceras engonatum, Conr.; Santa Barbara.
466. Cerastoma foliatum, Gmel.; Santa Barbara.
467. —— Nuttalli, Conr.; San Diego and Santa Barbara.
473. Muricidea Californica, Hds.; San Diego.
483. Fusus ambustus, Gld.; Santa Barbara.

### REMARKS.

269. *Leptothyra sanguinea*, Carp. Common at Monterey; all shades of color from light red to very dark purple; sometimes broadly banded with white; another variety is marked with irregular whitish streaks, causing a resemblance to the young shells of 282, *Omphalius fuscescens*.

275. *Trochiscus Norrisii*, Sby. The apex whorls of the young shells have a spiral band tesselated with white and red.

388. *Conus Californicus*, Hds. When young, the shells of this species are ornamented with yellowish brown markings upon a light bluish ground.

**A** *Surcula Carpenteriana*, Gabb. The most perfect recent specimen of this rare species that I have seen (described by Mr. Gabb in Vol. III, Cal. Acad. Pro. p. 183) was obtained by Mr. Hepburn; when perfect, one of the finest shells of the upper Californian province; the specimen referred to is of a clear light salmon color, traversed spirally by narrow bands or broad lines of reddish brown, and resembling in its general coloring that equally fine shell *Narona Cooperi*, Gabb, described as above, p. 186.

460*d*. *Purpura* var. *ostrina*, Gld. Deposits its yellowish eggs on the rocks at Black Point and the Cliff House near San Francisco, in the latter part of June (1865) and the middle of July (1866).

75. *Pachydesma crassatelloides*, Conr. Valves frequently marked with broad radiating bands of light brown.

266. *Pomaulax undosus*, Wood. Young shells approach closely to the immature form of Pachypoma gibberosum, Chemn.

281. Mr. Carpenter remarks in his supplementary Report to the B. A., in connection with *Chlorostoma aureotinctum*, Fbs.: "mouth orange spotted." I should amend this so as to read *umbilicus* stained with orange.

456. *Amphissa corrugata*, Rve. This species assumes nearly every shade of color and an innumerable variety of markings; the latter being generally some shade of brown upon a lighter colored ground.

74. *Amiantis callosa*, Conr. An aberrant form of this species in my collection suggests, in outline, Dosinia.

88. *Saxidomus aratus*, Gld. A single specimen of a young shell of this species (Coll. Stearns) is prettily marked with brown upon the posterior dorsal portion of the valves.

Professor Whitney read the following:

## Notice of the Occurrence of a Tungstate of Lime and Copper in Lower California.

BY J. D. WHITNEY.

Among some specimens brought from the vicinity of La Paz, Lower California, by Mr. Rémond, about three years since, was one which attracted my attention, as it seemed to contain an undescribed mineral. I therefore made an analysis of it and found it to consist of tungstic acid, oxide of copper, and lime, with a small quantity of water, probably not essential to its composition. The results of the analysis were as follows:

| | |
|---|---|
| Tungstic Acid | 79.69 |
| Oxide of Copper | 6.77 |
| Lime | 10.95 |
| Protoxide of Iron | .31 |
| Water | 1.40 |
| | 99.12 |

On examining to ascertain if there was any known mineral having a composition similar to this, I found that a tungstate of lime containing copper had been described by Domeyko as occurring in the copper mines of Llamuco, near Chuapa, in the province of Coquimbo, in Chili, where it was discovered by M. Gay (Annales des Mines (4) iii, 15). That mineral, however, only contained 3.3 per cent. of oxide of copper, while the one of which the analysis is given above contains 6.77 per cent. of that substance. M. Domeyko calls the mineral analyzed by him "Scheelin calcaire cuivreux," but does not attempt to give a formula for it, or to decide whether it is entitled to rank as a distinct species.

The Lower California mineral, of which the analysis is given above, occurs in a red metamorphic rock, associated with black tourmaline. It is crystalline-granular in structure, with a distinct cleavage in one direction, and seems to be homogeneous throughout. Its hardness is about that of Scheelite; luster, highly vitreous; streak, very light greenish-gray; color, pistachio green, passing to olive and leek green. Before the blowpipe in the glass tube it blackens, and gives off a little water. On charcoal it blackens instantly, becomes rounded on the edges, with a little intumescence, and gradually acquires the appearance of a slag, in which numerous fine points of metallic copper are seen. With the fluxes it gives the reactions of tungstic acid and copper. It is easily dissolved by chlorohydric acid, with separation of tungstic acid.

From the appearance of the mineral, I am inclined to regard it as having a definite* composition, represented by the formula $CuO\ WO_3+2\ (CaO\ WO_3)$; this formula would require the following composition:

| | |
|---|---|
| Tungstic Acid | 78.43 |
| Oxide of Copper | 8.95 |
| Lime | 12.62 |
| | 100.00 |

This agrees pretty well with the results of the analysis, although it is desirable that more specimens should be examined, and if possible from other localities. I am informed by Mr. Ashburner that he has noticed this mineral at more than one mine in Lower California.

At all events, I would suggest for the mineral in question the name of *Cuproscheelite*, as convenient for designating it, and as expressing its chemical and mineralogical relations, whether it be considered as a mineral substance having a distinct and fixed composition, or only as a variety of Scheelite, containing a large but uncertain amount of oxide of copper.

Dr. Ayres called attention to the fact that a carcase of a Black fish could be procured at the Potrero, at a small expense, and a subscription was raised for its purchase.

Professor Whitney exhibited a branch of *Sequoia sempervirens*, taken from a small tree growing near San Rafael, of which the leaves are entirely white. The tree presents a very singular appearance, surrounded as it is by other redwoods of the usual color. The fact was elicited that similar blanched redwoods exist in other localities in the Coast Ranges; but no explanation or theory was offered to account for this curious, abnormal blanching of the foliage of a single species—a similar condition of things not having been noticed, so far as known, in any other species than the redwood.

---

## REGULAR MEETING, AUGUST 20th, 1866.

Dr. Kellogg in the chair.

Ten members present.

Messrs. W. H. Knight and A. Godefroy were elected Resident Members.

Donations to the Library: Bibliography of North American Conchology previous to the year 1860, by W. G. Binney, Parts 1 and 2, 8vo., Washington, 1864. Cretaceous Reptiles of the United States, by J. Leidy, 4to., Washington, 1866. Palæontology of the Upper Missouri; Invertebrates, by F. B. Meek and F. V. Hayden, Part 1, 4to., Washington, 1865. List of the Coleoptera of North America, by J. L. Leconte, M.D. Part 1, 8vo., Washington, 1863. Researches upon the Hydrobiinæ and allied forms, by Dr. W. Stimpson, 8vo., Washington, 1865. Monograph of American Corbiculadæ, recent and fossil, by Temple Prime, 8vo., Washington. Catalogue of Minerals, with their formulas, etc., by T. Egleston, 8vo., Washington, 1863. Land and Fresh-water Shells of North America, by W. G. Binney, Parts 2 and 3, 8vo., Washington, 1865. Check list of the Invertebrate Fossils of North America; Eocene and Oligocene, by T. A. Conrad; Cretaceous and Jurassic, by F. B. Meek, two 8vo. pamphlets, Washington, 1864–6.

All of the above were published and presented by the Smithsonian Institution.

Prof. W. P. Blake presented the following communication:

## Miscellaneous Notices.

BY WILLIAM P. BLAKE,

Professor of Mineralogy, Geology, and Mining, Dept. Sci. Coll. of California.

### 1. *New Locality of Fossils in the Gold-bearing Rocks of California.*

I have obtained specimens of *Ammonites* from the cut in the rocks on the line of the Central Pacific Railroad, about two miles below Colfax, and in the heart of the main gold belt of the State.

The rock is a compact argillite, somewhat altered and much discolored by the peroxydation of iron. The strata are boldly flexed and are interstratified with coarse grits and a thick bed of conglomerate, so much altered that the pebbles are homogeneously cemented.

The substance of the fossils has been removed by percolating waters, but very perfect casts of them remain and show the details of the external form, but do not permit the septæ to be seen. It is thus not possible, perhaps, to determine the specific characters; and considering, also, the absence of a typical collection and works of reference, I do not attempt a minute description, preferring to refer the specimens to a palæontologist. It may, however, be observed that the fossils are undoubtedly of the secondary period, and that they are apparently specifically identical with those from the American river, in the same vicinity, of which I sent photographs to Mr. Meek, at the Smithsonian Institution, in 1863, and afterwards noticed at one of the meetings of this Academy, in September, 1864. They are, also, apparently identical with the species found in the Bear Valley, Mariposa, slates. If this species has not been already named, I desire to connect with it the name of Mr. Spear, in whose cabinet at Georgetown, the earliest specimen was carefully preserved. I obtained one specimen at the locality, and another was presented to me by Mr. Richard Carroll, it having been saved by the quarry men, under the impression that it was a petrified rattlesnake. It is about six inches in its longest diameter, being elliptical and evidently distorted by lateral pressure.

### II. TOOTH OF THE EXTINCT ELEPHANT, PLACER COUNTY.

I have received from Mr. Baker and Mr. Thompson, through the hands of Mr. E. Tyler, all of Placer County, a single molar tooth of *Elephas* found in the auriferous gravel near Michigan Bluffs, thus adding another locality to the list showing the former general distribution of the ancient elephants over this coast.

### III. SHARK TEETH AND OTHER MARINE REMAINS, TULARE COUNTY.

When at Ocoya or Posa Creek, in 1853, I collected a great number of shark teeth from the tops of the hills, at the base of the Sierra Nevada, on the east side of the Tulare Lake. These were described and figured in my Report to the U. S. Government. Having recently revisited that region, I found other localities, and made another collection, a part of which I now exhibit to the Academy. The following genera and species are represented: *Oxyrhina plana*, *O. tumula*, *Lamna clavata*, *Galeocerdo productus*, *Prionodon antiquus*, *Hemipristis heteropleurus*, *Notidanus*, (Nov. Sp.?) and *Zygobates*, a genus of the family of Skates, having pavement-like teeth. Vertebratæ, apparently of the whale, are abundant, and some fragments of the head. These remains are now at least twelve hundred feet above the sea, and being in unbroken horizontal strata, show a very great and general uplift of the region in comparative late times. The strata were referred to the Miocene in my Report, but I am now inclined to regard them as Post-Pliocene. It is interesting to note that these strata rest undisturbed upon granite, which is traversed by gold-bearing veins, not over five miles from the point where the fossils are found, and so low that the veins must have been covered by the sea prior to the elevation of the region.

### IV. QUARRY OF GOLD-BEARING ROCK.

The Baker or Whiskey Hill Mine of Placer County, a few miles from Lincoln, presents the novelty of profitable gold mining from a *quarry* in the slates without any well defined quartz vein. A hill with a rounded outline is covered with rough outcrops of rusty slate, over a breadth of two hundred feet or more. A quarry at one end exposes the slate, with a great variety of colors, from white to brown and red and black, the whole of it being soft and ochraceous, and in places stained green and blue with carbonate of copper. These variegated slates are like those commonly known, among California copper prospectors, as "calico rocks," and the ground was first located and prospected for copper.

It is evident that the formation consists of beds of iron pyrites (mundic) with a small but variable portion of copper pyrites, and that the rusty, upper portions are due to the gradual decomposition of the sulphurets above the permanent water-line, or where the atmosphere has had access. Below the water-line we may not expect to find the rusty ochrey slates. This is shown, also, at a shaft which has reached the water. Blocks of mundic, taken out of that shaft, are interstratified with talcose slate. At one point, in the bottom of the quarry, a layer of green and blue carbonate of copper is found, and this is evidently the result of a gradual concentration of the copper from the decomposed ground above. The soft slate, as quarried, is trammed to a five-stamp mill, with very coarse grates, and nearly forty tons are run through it daily. The pay is said to vary from two to twenty dollars, but the average is reported to be from five to six dollars per ton.

Mr. Stearns read the following:

Since my communication to the Academy of date July 16th last, on the Shells of Baulines Bay, additional specimens (4) of *Haliotis rufescens* have been found by Mr. Harford and Dr. Kellogg; also many specimens of *Katherina tunicata*, and one of *Mopalia Hindsii;* from between the umbos of very large specimens of *Mytilus Californianus*, collected by the same gentlemen, several specimens of *Barleia ? subtenuis* Carp.

In addition to the above marine forms, the following species were found by the same parties in a gulch at Belvidere Ranch, not far from Capt. Morgan's house, south side of Baulines Bay: *Helix Nickliniana, H. arrosa, H. infumata, H. Columbiana* (hirsute var.) and *H. Vancouverensis*. Also, near a small stream on the same ranch, *Bythinella Binneyi*, Tryon. The last named species had previously been found in this neighborhood by Rev. J. Rowell.

Prof. Blake mentioned that a tooth of a mastodon had been found about three miles from Antioch, near Monte Diablo, by Capt. Stevens.

Mr. Stearns gave an account of the Helix, its anatomy, geographical distribution, and use as an article of food and for medicinal purposes, in both ancient and modern times.

Prof. Blake stated that he had in his possession a portion of a human skull said to have been taken from a depth of 250 feet below the surface, near Columbia, in Tuolumne County.

## REGULAR MEETING, SEPTEMBER 3d, 1866.

President in the chair.

Twelve members present, and Mr. A. Wood as a visitor.

Mr. John Swett was elected a Resident Member.

Donations to the Cabinet: Two specimens of fishes from Dr. Kellogg and Dr. Behr; specimen of a fungus, *Polyporus igniarius*, from Dr. Kellogg.

Dr. Kellogg called the attention of the Academy to the remarkable specimen of fungus presented by him, *Polyporus igniarius*, which was found growing upon the Bay tree, *Oreodaphne Californica;* and gave a description of *Fungi* in general; alluding particularly to the destructive effect of many species, some producing the dry rot in ships, others destroying buildings, producing the disintegration of mortar in masonry, and seriously affecting the health, or destroying animal life.

Dr. Kellogg also remarked on the use of some species of Fungi for food, particularly by the natives of Australia, who regard them with especial favor for that purpose. The rapid growth and poisonous effect of certain species of Fungi were mentioned, also the use made of some species in the arts.

Mr. A. Wood, who has recently returned from a botanical exploration of Oregon, being present as a visitor, was invited to speak, and gave the following narrative of the recent ascent of Mount Hood, by himself and a party of gentlemen:

On the 20th of August last, in company with Dr. Atkinson, of Portland, and the Rev. J. Deardorff, of Walla Walla, and three others, I stood upon the summit of Mount Hood in Oregon. From our last camp on the summit of the Cascade Range to this point, the summit of Mount Hood is eleven miles of constant and weary ascent, at angles about as follows: Five miles in the first, 12 to 15° ; two miles to eternal snow, 25 to 30° ; one and one-half miles to the gap in the rim of the crater, about 45° ; the remaining ascent traversing the ancient crater, nearly or quite 60° ! The day was cloudless; a strong, warm wind from the southeast softened the surface of the snow and favored our ascent, although it gave us much anxiety lest it should loosen some of the tremendous acclivities of snow and overhanging drifts from above us.

Starting from camp at daylight, on horseback four miles, we arrived at the top at a quarter past two P.M., in nine and a half hours.

Our apparatus for measuring the heights consisted of two barometers, (aneroid) a thermometer, a tin cup, and a spirit lamp. Both barometers failed us, the index ceasing to turn after something more than a complete revolution on the dial. They were not made for such heights. But we made good use of our thermometer.

The ascent was exceedingly difficult, and not without danger. The long summer heat had undermined the snows, causing their surface to conform more to the ruggedness of the mountains, and the slides had opened chasms of invisible depths across our path. We looked down into several of these chasms and saw that the massive walls below consisted of solid, blue ice, and terminated at length in the blackness of darkness. We could hear the noise of running water, apparently in torrents. One of these chasms was unavoidable—*and must be crossed.* Its transverse length was nearly a mile, and its width from ten to one hundred feet. By the aid of a rope, forty-five yards in length, and five pike-poles, each eight feet, we crossed, (of course at the narrowest place) and afterward by rope and poles, tugging, panting, dizzy, we dragged ourselves up to the terrific crest of this Mountain Monarch.

The summit area is of very limited dimensions—a crescent in shape, half a mile in length, and *three* to forty or fifty feet in width. It is a fearful place, as it is the imminent brow of a precipice on the north, sheer down not less than a vertical mile of bare columnar rock!

This height is lifted so far above all other heights (except the four distant snow-clad peaks to the north and Mount Jefferson on the south) that the country beneath seemed depressed to a uniform level, and the horizon retreated to the distance of more than two hundred miles, including nearly all Oregon and Washington Territory. The sublimity and grandeur of that view I must leave to the imagination of the reader. A cañon of enormous depth plunges down along the southeast flank, and is filled in part by a glacier evidently in motion, and having below a very abrupt termination. Terminal and lateral *moraines* mark its course, and a torrent of water issues from beneath. While we delayed here, an avalanche of rocks, an immense mass, started by the wind, thundered down the left wall of this cañon several thousand feet, and its track was marked by a trail of white smoke.

On the west side of the ancient crater, at the base of a vast craggy pinnacle of rocks, (a portion of the ancient rim of the crater) is still an open abyss, whence issue constantly volumes of a strongly sulphurous smoke. That there is also heat there is evident from the immense depression of the snow about this place—depressed not less than a thousand feet below the snows which fill to the *brim* other portions of the ancient crater.

As I have already stated, we found our barometers useless in these vast heights, and were reduced to the use of the thermometer alone. By this we learned the boiling point of water at four several stations, as follows: At the camp, the summit of the Cascade Range, it stood in boiling water at 204° Fah. At the upper verge of the forest, it indicated 195½°. At the highest reach of all apparent vegetation, 192°; and finally at the summit, where, after the most persevering and determined efforts, (on account of the violence of the wind) we at length, by means of a spirit lamp, changed a portion of snow to a cup of boiling water, the mercury stood firm in the cup at 180°! These several results being changed to *feet of elevation*, according to the rule universally approved in such cases, indicate heights as follows, viz: At the summit of the Cascade Range, and foot of Mt. Hood proper, 4,400 feet; at the limit of forest trees, about 9,000 feet; at the highest limit of vegetation, 11,000 feet; at the summit of the mountain, 17,600 feet.

We earnestly hope that these results may be hereafter tested by the barometer; and by triangulation. Until then, we must adopt the estimate here made, as the height of that sublime peak, and accord to Mount Hood the distinction of being the highest land in the United States, if not the highest upon the North American continent.

---

## REGULAR MEETING, SEPTEMBER 17th, 1866.

Mr. Stearns in the chair.

Ten members present.

Messrs. B. P. Avery, James Spiers, and B. R. Norton were elected Resident Members.

Donations to the Library: Proceedings of the Mannheim Academy, from Dr. Behr.

The following paper was presented by Dr. J. G. Cooper:

## On a New Species of Pedipes, inhabiting the Coast of California.

BY J. G. COOPER, M.D.

### PEDIPES UNISULCATA, Cp. Fig. 29.

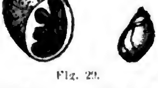


Fig. 29.

SP. CH. *P. t. Lacunoida*, obliqué ovata, peripheria laterali subrhomboidea, translucente succineo-brunnescente, spira producta, apice obtusa, anfr. iv et dim.; tertio tumido, sulcis iv, posteriori solum valde impresso, in ultimo evanescente; ult. lineis incrementis irregularibus sulco undulatis; punctis impressis numerosis sparsim ornato; apertura ovata, labro acuto purpurescente intus callo duplicato medio subtuberculoso; labio columellari albo, calloso, in plano aperturæ expanso; margine interno subverticali dentibus duobus subacutis, superiori majore; callo tenui expanso in parietem interno, dente lamellari valido in plano parietis externi expanso, dimidium latitudinis aperturæ transeunte; intervallis dentium parietumque equalibus.

*Specific Characters.*—Shell like a *Lacuna*, obliquely ovate, the lateral outline subrhomboid, translucent, amber-brown, the spire produced, apex obtuse, whorls 4½, the third swollen, with four shallow grooves, the posterior one only much impressed, but vanishing on the last whorl; body with irregular lines of growth undulating across the groove; numerous scattered impressed points; aperture ovate, the outer lip acute, purplish, with a double callus within slightly tuberculate at the middle; columellar lip white, callous, expanded in the plane of the aperture; its inner margin subvertical, with two subacute teeth, the upper largest; a thin callus expanded over the inner wall, with a strong lamellar tooth expanded in the plane of the outer wall, and crossing half the width of the aperture; intervals between the teeth and walls equal.

| | |
|---|---|
| Long. 0.32 unc.=8 mill. | Long. apert. 0.25 unc. |
| Lat. 0.22 " | Lat. " 0.19 unc. |
| Long. spiræ 0.12=3 " | Div. 40° and 45°. |

*Hab.*—San Pedro, Cal., estuaries.

Only four specimens were found dead near the old landing, close to the mouth of the bay, in October, 1861. I supposed them to be *P. lirata* Binn, but they are nearly three times as large, not lirate, etc. That species is catalogued by Carpenter as among the collections from San Diego, in the Supp. Rep. etc., 1863, pp. 612, 647, 673, but I do not find it in the State collection. Those described are fresh and shining in the mouth—dull, but not much worn, outside.

This is a very interesting shell, being one of the links between the land and marine mollusca—the species of the genus being chiefly tropical, occurring at Cape St. Lucas, Panama, West Indies, Africa, and Isle of France, according to Binney, who says that they inhabit crevices of rocks, especially those exposed to the full force of the tide; but being pulmonate, they can probably live long with but little moisture. On the rocks the living shell would be mistaken for a *Lacuna* or *Littorina*, and the form of our species reminds one strongly of *Succinea Oregonensis*.

A communication was received from Dr. Canfield of Monterey, giving an account of the discovery in Monterey Bay, of a fish, pronounced by the naturalists of the Smithsonian Institution to be a new species of *Bdellostoma*, a genus not previously known to exist nearer than the coast of Chili.

Mr. Falkenau made some remarks on the use and value of the spectroscope in chemical analysis and in other scientific investigations.

### REGULAR MEETING, OCTOBER 1st, 1866.

President in the chair.

Fourteen members present.

Messrs. A. Winslow Boynton, and T. C. Leonard were elected Resident Members.

The resignation of Royal Fisk, Resident Member, was received and accepted.

Donations to the Cabinet: A specimen of black oxide of manganese from Red Rock, by Mr. Stearns; fossils from near Nanaimo, by Dr. Comrie.

Dr. Behr made some remarks upon the *Lepidoptera* and the four different stages of their development, noticing the fact that the length of time of the egg state in some species, for instance the Chinese silkworm, admits of the transportation of the same to foreign countries, while in the Californian silkworm, *Saturnia ceanothi*, the period of the egg state is so brief as to render it impossible to transport the eggs either to New York or Europe. Dr. Behr also explained the difference between the larva state in the *Lepidoptera* and other classes of insects, and referred to the importance of the larva condition in insects as a basis for classification, and mentioned many interesting proofs of the tenacity of life during the *chrysalis* or *pupa* state; alluding to the different classes of moths in which wingless females occur, a peculiarity that is unknown to the butterflies.

Mr. Bolander stated that in his "Remarks on California Trees," made at the meeting of October 16th, 1865, and published in the current volume, (p. 225) he had referred a small pine growing on the plains between Mendocino City and Noyo, to *Pinus murcata;* but he could now state positively that it is the true *Pinus contorta* of Douglas. He stated also, that No. 7, noticed on page 227 of that article, is *P. muricata.* Farther, on page 229, *Quercus Wislizeni*, Englm. is wrongfully referred to *Q. agrifolia. Q. Wislizeni* is a well characterized species with biennial fruit; the fruit of *Q. agrifolia*, on the other hand, is annual. These two oaks differ also materially in their distribution. *Q. Wislizeni* is found chiefly in the lower Sierra, and in the small valleys east of the redwoods in Mendocino County. *Q. agrifolia* occurs almost exclusively in the vicinity of San Francisco Bay, and on the banks of streams emptying into it. It extends also southward, approaching the coast more nearly as we reach Monterey.

---

### REGULAR MEETING, OCTOBER 15th, 1866.

Dr. Kellogg in the chair.

Eleven members present.

Mr. A. L. Bancroft was elected a Resident Member.

Donations to the Library:

Bodemann and Kerl's Treatise on Assaying, translated by W. A. Goodyear, presented by the translator.

Prof. W. P. Blake read the following:

### Mineralogical Notices.—No. II.

BY WM. P. BLAKE.

*Kerargyrite.*—Chloride of silver in remarkably fine specimens occurs in the "Poorman lode," Idaho, associated with Proustite (light red silver ore), native silver and native gold. Sheets of the chloride are taken out of the soft clay of the vein, and are from one-eighth to one-quarter of an inch in thickness. It is also found in irregular massive aggregations of crystals, in cubes, without any modification, and over an eighth of an inch square. The color of my specimens is brown, passing into violet blue in some portions.

*Proustite.*—The "ruby silver" which occurs with the chloride in the Poorman lode, as above, is often in masses of several ounces, or even pounds, in weight, and it is reported to be occasionally seen in beautiful crystals, but none have yet come under my observation.

*Copper Glance, Red Oxide of Copper, Native Copper.*—These species are found together in the "Red Cap claim," Klamath County, California, in serpentine. The metallic copper is seen in points throughout the massive sulphuret, and is sometimes enveloped in red oxide. Both copper and oxide are most abundant in the outer portions of the ore, as found, and they are apparently formed by the gradual decomposition of the sulphuret.

*Danaite.*—A cobaltic variety of mispickel is found associated with iron and copper pyrites at Meadow Lake, Nevada County, California. It is in distinct, well formed, brilliant crystals, of a tin-white color, and about a quarter of an inch in diameter. They are modified nearly as in fig. 289, Dana's Min. This mineral gives cobalt reactions before the blowpipe, and appears to contain a large per centage of this metal. The ore is said to contain *nickel*, also, and is being mined for shipment.

*Cinnabar in Calcite.*—Cinnabar of a beautiful vermilion color is found in an unusual form in Idaho, being abundantly spread through a gangue of massive, compact limestone or marble. It is so compact and homogeneous that specimens may be cut and polished like marble. There are no evidences in the ore that I have received of the presence of other minerals, not even of quartz.

College of California, Nov. 17, 1866.

Mr. Stearns read the following:

It is my painful duty to inform the Academy of the decease of Robert Kennicott. The meager information received furnishes no particulars, further than that he died suddenly, in the month of May last, at Nulato Bay, in Russian America.

The services rendered to science by Mr. Kennicott are worthy of something more than a passing notice. In the month of May, in the year 1859, we find him starting upon a prolonged exploration of Russian America, under the auspices of the Smithsonian Institute, assisted by the University of Michigan, the Audubon Club of Chicago, and the Academy of Sciences of the same city. This exploration, including also a portion of the territory held by the Hudson's Bay Company, extended from May, 1859, to the date of his return in October, 1862. From the Annual Report of the Smithsonian Institute we learn that "the route traversed by Mr. Kennicott was from Lake Superior along the Kamenistiquoy River and Rainy and Winnipeg Lakes, up the Saskatchewan River to Cumberland House; thence nearly north to Fort Churchill, on English River, up the latter to Methy portage, at which point he first reached the head waters of the streams flowing into the Arctic ocean; thence along the Clear Water River and Athabasca Lake, down Peace River into Great Slave Lake, and along the Mackenzie River to Fort Simpson. At this place Mr. Kennicott spent a part of the first winter, making excursions up the Liard River to Fort Liard in autumn, and again on snowshoes in January. Before the close of the same winter he went up the Mackenzie to Big Island, and thence northwest to Fort Rae, near the site of old Fort Providence. From this point he traveled on the ice across Great Slave Lake to Fort Resolution, at the mouth of Peace River, where he spent the summer of 1860. He next descended the Mackenzie to Peel's River, and thence proceeded westward across the Rocky Mountains and down the Porcupine River to the Youkon, in the vicinity of which he spent the winter of 1860–61 and the summer of the latter year. The winter of 1861–2 was spent at Peel's River and LaPierre's house in the Rocky Mountains, and in traveling from this point to Fort Simpson and back to Fort Good

Hope, on the Mackenzie. He left the last mentioned place on the first of June, 1862, and reached home in October. This enterprise terminated favorably, the explorer having returned richly laden with specimens, after making a series of observations on the physical geography, ethnology, and the habits of animals of the regions visited, furnishing materials of great interest to science."

Aside from the extensive collections in every department of natural history, the geographical information acquired by Mr. Kennicott was of the greatest importance.

In 1865, the Western Union Telegraph Company having determined to extend their wires so as to connect the old world and the new by an overland line passing through Russian America across Behring's Sea to Russia in Asia, and thence to the central cities of Europe, Mr. Kennicott's knowledge of the territory through which the proposed line was to pass made his services indispensable to the Company. He was sought out, and his coöperation at once secured. He entered upon this new labor, hoping not only to do whatever lay in his power to make this enterprise a success, but hoping also still further to serve the great cause that was so dear to him; and while thus engaged in the enthusiastic performance of this self-imposed duty, in the prime of life, he has passed away.

Dr. Gibbons made some remarks on the relations of our climate to that of the Great Basin, and the Eastern States.

He also made some observations on *Zirphea crispata*, living in the bay near Alameda.

---

## REGULAR MEETING, NOVEMBER 5th, 1866.

President in the chair.

Fourteen members present.

Rev. S. D. Simonds and Dr. J. Morrison were elected Resident Members, and Dr. W. P. Gibbons, of Alameda, a Corresponding Member.

Mr. Bolander presented a curiously fruited specimen of *Quercus densiflora*, the acorns being only about one-third of the ordinary diameter, although nearly the usual length, and having a peculiar constriction near the apex. It was collected by Mr. Wertheman, near Coarse Gold Gulch, Fresno County.

Mr. Stearns exhibited a specimen of an *Astrophyton*, caught in the Ochotsk Sea, off Cape Lepatka, Kamschatka, by the crew of the fishing brig Angenette.

Dr. H. Gibbons called the attention of the Academy to the near approach of the season during which we might look for the recurrence of the "meteoric shower," which he witnessed in the year 1833.

Some remarks were made by Messrs. Gibbons, Keyes, Kellogg and others in reference to the phenomena of meteors, and considerable discussion followed as to the various ideas and theories advanced in regard to them by different authors.

Mr. Stearns exhibited several specimens of *Acmæa asmi*, Midd., collected by him at Baulines Bay; remarking that upon a recent trip to the locality named, he found this species exceedingly numerous, attached to *Chlorostoma funebrale*, A. Ad.; that he had not seen in a single instance this Acmæa upon the rocks. Mr. Stearns further submitted for the inspection of the Academy, a specimen of *Haliotis Cracherodii*, which he had collected alive last month, on the rocks near the outlet of Lobitas Creek into the ocean. The Haliotis had been attacked by a pholad, probably *Navea Newcombii*, and had defended itself by adding coating upon coating of nacre, as the Navea progressed, until a large knob or protuberance had been created in the interior of the shell. From a partial examination of the borer, a specimen of which he had dug out from another portion of the same Haliotis, he believed it to belong to the species recently described by Mr. Tryon, viz: *Navea Newcombii.*

## REGULAR MEETING, NOVEMBER 19TH, 1866.

President in the Chair.

Thirteen members present.

Mr. J. B. Russell and Dr. E. Belle were elected Resident Members.

Donation to the Cabinet: Specimens of Copper ore from Chihuahua, by Mr. R. C. Jacobs.

Donation to the Library: On the Corals and Polyps of Panama, with descriptions of new species, by A. E. Verrill, 8vo. pamphlet.

Prof. Whitney presented the following communication from Wm. M. Gabb:

## On the Subdivisions of the Cretaceous Formation in California.

BY WM. M. GABB.

The recent appearance of a check list published by the Smithsonian Institute, and entitled "Check List of the Invertebrate Fossils of North America—Eocene and Oligocene—by T. A. Conrad," renders it necessary that I should state more clearly than has been done heretofore, the relations between the two members of the Californian Cretaceous rocks; and should give all of the proofs that have yet presented themselves, in support of my views.

In 1856, Mr. Conrad published a paper in Vol. 5, Pacific Railroad Reports, pages 320, *et seq.*, in which he described fifteen shells from the "Eocene" rocks of the Cañada de las Uvas, near the present site of Fort Tejon. Of these, eleven were considered by that author as being new to science. The other four were referred to previously described Eocene forms.

These specimens were procured by Mr. Wm. P. Blake, geologist of the expedition. They were obtained from a single boulder, the only one found by that gentleman.

In consideration of the scanty material, it is by no means surprising that Mr. Conrad should have made the determination that he did. The fossils of this locality, and, in fact, of this member of our Californian rocks, have a marked Tertiary aspect. This holds good, both as applied to the appearance of the specimens and also to the grouping of the genera. Mr. Conrad's reference of these fossils to an Eocene age was perfectly justified by the light that he then possessed. Any other palæontologist, with the same specimens, would no doubt have done as he did. But I propose to prove that, after having studied this formation for five years, both in the field and in the closet—both palæontologically and stratigraphically—after having traced it upwards of four hundred miles, and after having collected fossils from it at a dozen localities, I, on the other hand, am perfectly justified in pronouncing it most unequivocally Cretaceous.

It is, to use a mild term, rather surprising that Mr. Blake, from whom Mr. Conrad obtained his material, should not have collected more specimens. According to his report, Mr. Blake reached the depôt camp at Tejon, on the third of September, 1853, and did not leave that vicinity until October 10th. During that time he traversed the distance between Tejon and the Cañada de las Uvas, four times. I am familiar with every foot of the ground on which he camped or on which he travelled; and I speak from personal observation, when I say that in going from one point to the other he could not avoid passing thousands of boulders and pebbles, full of fossils, similar to the single one sent to

Mr. Conrad. In riding from the Ranch house of Tejon to Fort Tejon, on Mr. Blake's trail, Professor Brewer and myself collected upward of *forty* species of mollusca in less than one hour, and without diverging ten feet from our route!

The Californian Cretaceous formation is easily separable into two main divisions. The older of these, designated in the Report as "Division A," is the equivalent of the upper portions, Nos. 4 and 5, of Meek and Hayden's section in Nebraska, and the later beds of New Jersey and the Gulf States. It is possible that this group may be separated hereafter into two sub-groups; but that has no bearing on the question at issue. The upper or more modern member, found overlying the lower one conformably in various places, as about Monte Diablo and at Martinez, has no apparent equivalent in America. It is probably, however, the American representative of the Maestricht beds, the 'Danien' of French authors. It is *not* a transition from Cretaceous to Tertiary, but is the most modern member of the former formation.

It has many points in common with the Maestricht beds of Europe. It contains but a single species, so far as known, of the complex-chambered group of Cephalopods. A solitary ammonite, represented by half a dozen specimens, has been found by myself, in place, even to the very top of the formation.

Of 280 species of fossils recognized and named in the Californian Cretaceous rocks, 107 are found in this upper member. Of these, 84 are peculiar, and 23 are found in common between undoubted members of this group and undoubted members of the older group. Besides this, I was fortunate enough to discover a locality near Clear Lake, this fall, where, within a space of two feet, I found an admixture of upper and lower forms, proving the existence of a transitionary bed or perhaps group of beds. The following table will exhibit at a glance the grouping of species at each of the principal localities; showing at the same time which species are found in the intermediate deposit, and which exist in common in both the upper and lower divisions. The various localities are designated by letters, as follows: M, Martinez; C, Clayton to Marsh's; T, vicinity of Fort Tejon; G, a locality 10 miles west of Griswold's near New Idria; I, New Idria; D, San Diego; L L, Lower Lake Village, 1 mile S.E. of the town.

TABLE OF SUBDIVISIONS OF CRETACEOUS FORMATION.

| | Upper Division. | Intermediate Beds. | Lower Division, and Remarks. |
|---|---|---|---|
| Callianassa Stimpsonii | C. T. | | Chico. |
| Aturia Mathewsonii | M. C. T. | | Martinez. |
| Nautilus Texanus | C. | | Shasta Co. |
| Ammonites, n. s. | C. M. | | Curry's; Benicia; Martinez. |
| Typhis antiquus | M. T. | | |
| Fusus Martinez | M. T. | | |
| F. Mathewsonii | M. C. | | Curry's. |
| F. Diaboli | C. | | |
| F. aratus | M. | | |
| F. Californicus | C. T. | LL. | |
| Hemifusus Hornii | T. | | |
| H. Cooperii | C. D. | | |
| H. Remondii | M. C. T. G. | | |

| | Upper Division. | Intermediate Beds. | Lower Division, and Remarks. |
|---|---|---|---|
| ? Neptunea supraplicata | C. D. | | |
| N. gracilis | M. | | |
| Perissolax brevirostris | | LL. | Many localities. |
| P. Blakei | M. C. T. | | |
| Turris Claytonensis | C. T. | | |
| Turris raricostata | C. | | (*varicostata* by error in Rep.) |
| Cordiera microptygma | T. | | |
| Tritonium Hornii | C. T. | | |
| T. Diegoensis | D. | | |
| T. pancivaricatum | T. | | |
| T. Whitneyi | T. D. | | |
| Buccinum liratum | M. | LL. | |
| Nassa cretacea | M. T. G. | | |
| Pseudoliva lineata | M. | | |
| Pseudoliva volutæformis | T. | | |
| Olivella Mathewsonii | M. T. G. C. | | |
| Ancillaria elongata | C. D. | | |
| Fasciolaria læviuscula | C. | LL. | |
| F. sinuata | T. D. | | |
| F. Io | T. | | |
| Mitra cretacea | M. | | |
| Whitneya ficus | T. | | |
| Ficus mamillatus | T. | | |
| Natica Uvasana | T. | | |
| Lunatia Shumardiana | | LL. | Martinez and elsewhere.[*] |
| L. Hornii | T. | | |
| L. nuciformis | C. T. (D.?) | | |
| Gyrodes expansa | | LL. | Almost everywhere. |
| Neverita secta | T. | | |
| N. n. s. | G. I. | | |
| Naticina obliqua | M. T. | | |
| Amauropsis alveata | M.C. T. G. D. | LL. | Curry's; S. of Mt. Diablo. |
| Morio tuberculatus | M.T. C. G. D. | | |
| Scalaria(Opalia)Mathewsonii | M. | | |
| Niso polita | M. T. | | |
| Cerithiopsis alternata | M. C. | | |
| Architectonica cognata | M. C. T. | | |
| A. Hornii | T. | | |
| Margaritella crenulata | D. | | |
| Conus Remondii | M. C. T. D. | | |
| C. Hornii | T. | | |
| C. sinuatus | T. | | |
| Rimella canalifera | M. T. | | |
| R. simplex | C. D. | | |
| Aporrhais angulata | M | | |
| Cypræa Bayerquei | M. C. | | |
| Turitella Uvasana | M. C. T. G. | | |
| T. Saffordii | | LL. | M. and Solano Co. |
| T. infragranulata | M. | | |
| Galerus excentricus | M.C.T.D.I. | LL. | |
| Spirocrypta pileum | T. I. | LL. | |
| Gadus pusillus | M. T. | | |
| Dentalium Cooperii | M. D. | | Curry's; S. of Mt. Diablo. |
| D. stramineum | M. D. | | Curry's; S. of Mt. Diablo. |
| Bulla Hornii | T. | | |

---

[*] This species was referred by inadvertence to Div. B. instead of A. This is the first time it has been found beyond the limits of the lower member.

| | Upper Division. | Intermediate Beds. | Lower Division, and Remarks. |
|---|---|---|---|
| Cylichna costata | M. C. T. D. | | M., Texas Flat, and many other localities. |
| Megistostoma striata | M. | | |
| Martesia clausa | G. | | Pence's, Texas Flat, etc. |
| Solen parallelus | M. C. T. | | |
| Solena Diegoensis | D. | | |
| Corbula Hornii | T. | | |
| C. parilis | G. M. D. | | |
| Neæra dolabræformis | M. | | |
| Mactra Ashburnerii | M. C. T. | | Nearly everywhere in both Divisions. |
| Gari texta | M. | | |
| Tellina longa | M. C. T. | | |
| Tellina Remondii | C. T. | | |
| T. Hoffmanniana | G. | | M., Pence's, and elsewhere. |
| T. Hornii | T. | | |
| T. Californica | C. T. | | |
| Meretrix Uvasana | M.C.T.I.G.D. | | |
| M. Hornii | T. | | |
| M. ovalis | T. | | |
| Dosinia elevata | T. | | |
| D. gyrata | M. C. T. G. | | |
| Tapes Conradiana | G. M. T. | LL. | |
| T. quadrata | M. T. | | |
| Cardium Cooperii | M. T. D. | | |
| C. Brewerii | M. C. T. G. | | |
| Cardita Hornii | M. C. T. I. G. | | |
| Lucina cumulata | T. | | |
| L. cretacea | C. | | |
| Mysia polita | M. C. I. | | |
| Crassatella grandis | M. T. | LL. | |
| C. Uvasana | T. | | |
| Mytilus ascia | T. | | |
| Modiola ornata | M. C. T. I. | | |
| Septifer dichotomus | T. | | |
| Crenella concentrica | M. | | |
| Avicula pellucida | M. G. | LL. | S. Louis Gonzaga. |
| Arca Hornii | T. | | |
| Cucullæa Mathewsonii | C. | LL. | M. |
| Barbatia Morsei | D. | | |
| Axinæa sagittata | M. T. G. | | |
| A. Veatchii | | LL. | M., Tuscan Springs, etc. |
| Nucula (Acila) truncata | M. T. | | Everywhere. |
| Læda protexta | M. C. T. G. | | M. |
| Placunanomia inornata | D. | | |
| Flabellum Remondianum | C. | | |

On studying the foregoing table, the following deductions present themselves: 1st, that the rocks of the upper division, at the various localities quoted, are all of the same geological age; and 2d, that they are intimately connected with the older groups by a passage of nearly a fifth of all the contained species of fossils from this, either into the intermediate beds, or into the lower group itself.

In anticipation of a possible objection that may be raised here, it will probably be as well, before going further, to state that in the Division B, there has been no confounding of two groups. The same grouping of species extends to the extreme upper limits of the fossiliferous rocks, which are everywhere overlain by an immense deposit of non-fossiliferous sandstones. Another objection, which has already been raised, that the acknowledged Cretaceous fossils have become mixed with more modern species by the breaking up and re-cementing of an older formation, I shall not even attempt to refute. Had such been the case, I would ere this, in common honesty, have acknowledged it.

In support of the two conclusions arrived at above, we have the following synopsis of the table:

Of the 107 species of fossils found in Division B, 44 are found at Clayton, 67 at Tejon, 54 at Martinez, 22 at San Diego, 18 near Griswold's, and 7 near New Idria. It is not intended to be understood that these are all of the species found at these localities; but that, up to the present time, these are all that have been identified or described. Future work will undoubtedly change the above figures.

Of the species found at the above localities, 50 are peculiar to one or another locality; 29 are found at two localities only, 14 at three localities, and 14 at four localities or more.

Taking the three typical localities, Martinez, Clayton and Tejon, 21 species are common to Martinez and Clayton, 30 to Martinez and Tejon, 25 to Clayton and Tejon, and 20 are found at all three localities.

Now, having given what I believe ought to be considered proof conclusive to any candid mind in support of my first proposition, I shall endeavor to establish the second.

It will be seen that 16 species, found in the upper member, also extend into the older group, Division A. In addition to this, at the locality near Lower Lake Village, Lake County, besides several species encountered for the first time, I found 15 species in the same bed, within a superficial area of two feet. Of these, 3 were previously known to be common to the upper and lower division. Besides these 3, 7 of them were common to this locality, and localities of Division B, and the remaining 5 were, before this discovery, considered peculiar to the lower member. One of these 5 is found in the Mississippi Valley, in the "Ripley Group," and another belongs to a peculiarly Cretaceous genus.

As to the species found at the several typical localities, independent of each other, and which would serve to show their individual relations to the older formation without corroborative evidence, Clayton has 10 species in common with Division A, Tejon has 7, and Martinez 11. With the Lower Lake bed, Clayton has 5 species in common, Tejon 5, and Martinez 6.

In glancing over Mr. Conrad's "check list," I find that out of the 107 species found in his "Older Eocene of California," he has only included 74 in his enumeration. He has omitted Callianassa Stimpsonii, Ammonites n. s., Nautilus Texanus, Cylichna costata, Mactra Ashburnerii, Cucullæa Mathewsonii, Nucula truncata, and Leda protexta; eight species, which I mentioned in the Journal of Conchology, (Vol. 2, p. 88) as being found in common in the two members of the Cal. cretaceous, stating distinctly the localities in which they had been found. At the same time he includes five other species, from the same list, in his Eocene catalogue. Whether this be carelessness, or an unfair avoidance of a difficulty, I leave to others to decide. It is far easier to ignore such a difficulty than it is to explain it away.

In regard to the distribution of the genera and species in this and the associated rocks. All of the species are peculiar to this group, or to this and *underlying* rocks ; *not one* has been found associated either with living forms, or with species known to occur in the recognized Tertiaries of California. Five of the genera are peculiar to the Secondary. An Ammonite ranges entirely through the group to the top of the highest fossiliferous strata. The genera Perissolax, Gyrodes, Margaritella, and the sub-genus Anchura, of the genus Aporrhais, are all recognized as strictly characteristic of the Cretaceous ; so much so, that the presence of a single undoubted representative of either of these genera would be strong presumptive evidence of the Cretaceous age of any rocks in which it might be found. On the other hand, the presence of such genera as those in the list given below, would point to a very modern era in the Cretaceous, to say the least.

It must be borne in mind that we have much to learn yet in palæontology, especially in the matter of the vertical range of genera. Every year we find genera, nay, whole families, extending themselves beyond what had been fixed by previous authors as their limits. A few years ago, the presence of mammal ian remains was considered characteristic of the Tertiaries. Now we know of Marsupials in the Trias, and who dare say that we cannot find mammals in palæozoic rocks? I therefore maintain, that though we have here such genera as Aturia, Typhis, Cordiera, Pseudoliva, Nassa, Mitra, Ficus, Morio, Cerithiopsis, Cypræa and Galerus, still, the only inference that can be drawn is, that the group is on or near the verge of the formation, a sort of prophetic member, presaging by some of its genera the formations to come, but indissolubly bound by specific ties with the eras preceding.

Prof. Blake stated that he considered the collections made by him, in and near the Cañada de las Uvas, as not meager. There was a sufficient number of species to make a quarto plate of figures.

Prof. Blake read the following notice :

## Fossil Fish in the Great Basin, Nevada.

BY WM. P. BLAKE.

Fossilized fish are found in a light-colored clay shale, in the mountains a few miles north of Silver Peak, a mining district in the Red Mountain or Salt Basin region, about one hundred and fifty miles south of Austin. The vertebral columns, ribs and fins are very distinctly shown, and the specimens are exceedingly interesting. They remind me of the specimens from the famous locality of Mount Bolca, in Europe. The specimen that I have here, does not appear to belong to an ancient period, but I will not venture to refer it without an opportunity of making comparisons, or submitting it to a competent ichthyologist, which I propose to do.

College of California, Nov. 19, 1866.

Prof. Blake also directed the attention of the Academy to specimens of fossil vertebræ, collected by him in Tulare County. These specimens are about twenty in number, and are from two to six inches in length, and two to three inches in diameter. He believed them to belong to large marine saurians, like crocodiles, but wished to make further study and comparison previous to making a more formal communication to the Academy. If correct in his opinion, it was, he believed, the first instance of the discovery of saurian remains on the Pacific Coast of the United States, and the discovery will be rendered still more interesting by the fact that the remains occur in strata reputed to be miocene, associated with sharks' teeth and numerous marine remains, at least fifteen hundred feet above the present ocean level.

Professor Whitney remarked that the remains of the crocodile, and ichthyosaurus had been discovered on this coast by the Geological Survey, and the fact published a year ago.

Professor Whitney read the following communication:

## Notice of the occurrence of the Silurian Series in Nevada.

BY J. D. WHITNEY.

At a meeting of the Academy in May last, I gave some account of the geology of the State of Nevada, with particular reference to the age of the stratified deposits occurring there, as determined from the collections of fossils brought from that region to the office of the Geological Survey, by J. E. Clayton, and various members of our corps. In that communication I spoke of the probable future discovery of rocks older than the Carboniferous or Devonian, in the mountain ranges near Austin. This expectation has been realized, and we are now in possession of a very interesting collection of fossils, obtained by Mr. A. Blatchley, in the vicinity of the Hot Creek Mining District about one hundred miles southeast of Austin. This collection enables us to state positively that both Upper and Lower Silurian rocks occur in that district, and that they are well filled with fossils; not less so indeed, to judge from the specimens received, than the strata of the same age in New York, Ohio, Iowa, and Wisconsin, which they resemble in a most marked degree, both lithologically and palæontologically.

The fossils from the Hot Creek District are mostly weathered out on the surfaces of thin slabs of bluish-gray argillaceous limestones, and are crowded together in the same profusion with which they have often been noticed by myself and others as occurring in the Lower Silurian shales and limestones of the Wisconsin Lead Region, around Big Bay des Noquets, and in many other localities in the country bordering on the Great Lakes.

Both the upper and lower divisions of the Silurian appear to be represented by the fossils of the Hot Creek District; but the lower Silurian seems to be much the most prolific in fossils, as is the case in Wisconsin and Iowa. The particular period to which these lower Silurian forms may be referred is the Trenton, including the Chazy, Birdseye, Black River and Trenton limestones of the New York Geologists, and the Buff and Blue limestones of the Western surveys. Nearly all the prevailing types of the Eastern rocks of this age, are represented in the Hot Creek collection, namely: Brachiopods, Gasteropods, Cephalopods, Crinoids, Trilobites, and Corals; and there are among them several of the most widely-distributed and most characteristic species of the Lower Silurian. The following have been identified: *Maclurea magna*, a characteristic Chazy species, and *Pleurotoma lenticularis, Orthis testudinaria* and *Chætetes lycoperdon*, all of which are abundant in the Trenton limestone of New York, and the rocks of the same age farther West. Among the fragments of Trilobites, two or three different genera may be recognized, especially *Asaphus*, which is represented by a species apparently new. There are also fragments of crinoids or cystids closely resembling the species figured by Hall, in the Palæontology of New York, Vol. I, as *Echino-encrinites anatiformis.*

The rocks containing the above mentioned fossils crop out in the sides of a deep cañon; and overlying them, at a perpendicular distance of about a thousand feet, is a series of beds containing numerous fragments of corals and crinoids, silicified and weathered out from the surface of a bluish-gray limestone, which I refer without much doubt to the age of the Niagara limestone of New York. Among the corals, *Heliolites spinipora* and *Syringopora* are recognizable; and among the crinoidal fragments are stems of what appears to be *Caryocrinus ornatus.*

With the exception of the Potsdam sandstone fossils, described by Meek and Hayden as occurring at the base of the fossiliferous series, in the Black Hills, no recognizable Silurian forms have been observed by geologists, in the Rocky Mountains, or anywhere to the west of them, unless possibly in New Mexico. The Silurian Series, with the possible exception of the Potsdam sandstone, seems to be entirely wanting in the Rocky Mountains proper, the Black Hills being a sort of outlier of the main ranges, and lying as far east as the one hundred and third to the one hundred and fifth meridian. Dr. Hayden says, in his paper, on the Geology and Natural History of the Upper Missouri, published in 1862, that " hitherto no indications of the existence of any other member (than the Potsdam sandstone) of the Silurian period has been discovered along the eastern slope of the Rocky Mountains within the boundary of the United States. He considers it probable that the Potsdam sandstone is represented in the Rocky Mountains, although no fossils of that member of the series has been as yet discovered anywhere to the west of the Black Hills.

On the Mexican Boundary Survey, a few fragments of fossils were found in the superficial detritus, near El Paso, (Longitude, one hundred and six degrees) which indicated the existence of Silurian rocks in that vicinity; but none appear to have been found in place. Professor Hall remarks that "the specimens referable to strata of this age (Devonian and Silurian) are few, and they are in such condition as to give little satisfactory information regarding the rocks in place." The specimens obtained are figured in the Mexican Boundary Report, but not described, nor is their locality accurately stated.

Dr. Newberry, in his Report in the Geology of the Colorado River region, refers the lower portion of the strata exposed in the grand cañons of that river to the Devonian aud Silurian Series; but as no recognizable fossils were discovered by the Ives' Expedition from any rocks lower than the Carboniferous, this reference can only be taken as expressing a conviction based on lithological characters and stratigraphical considerations.

In view of the above cited facts, it will be seen at once how interesting this discovery is of undoubted Silurian rocks west of the Rocky Mountains; and the more so, since we have in this remote region a recurrence of conditions and forms of animal life so closely allied to those with which we are familiar in the States east of the Mississippi. It is a very remarkable fact that these rocks have not been discovered in the Rocky Mountains; and should farther explorations fail to reveal their presence, it will throw a new light on the history of the physical development of the central and western portions of this continent. Taking into view what has now been communicated, and what was stated in my previous paper in regard to the existence of the older stratified rocks in the Silver Peak District, it will appear that Dr. Newberry's generalizations were, in all probability, correct, and that we may expect to find in southern and southwestern Nevada the outcropping fossiliferous edges of the strata underlying the Carboniferous of the great Arizona or Colorado plateau, and that they will be proved to occupy an extensive area, and to yield a profusion of organic remains.

Among the specimens collected by Mr. Blatchley, as also by Mr. Clayton, Mr. Melville Attwood, and Dr. C. L. Anderson, and now at our office, there is a considerable number which demonstrate the existence of an extensive fresh-water Tertiary deposit in Nevada. This formation, which belongs to a very late Tertiary epoch, evidently occupies a considerable area, as our specimens come from localities hundreds of miles distant from each other. The existence of any marine formation more recent than the Jurassic, in Nevada, has not yet been proved; but, as Mr. Gabb obtained evidence, in 1864, of the occurrence of rocks of Cretaceous age on Crooked River, in Oregon, east of the Cascade Range, it is possible that this member of the series may yet be discovered in Nevada.

All the fossils referred to in this and my previous communication on the geology of Nevada, will receive, in due time, thorough investigation at the hands of Messrs. Meek and Gabb, or other competent palæontologists; and we expect that our collections from that State will be largely increased during the present year.

The death of the eminent naturalist, Dr. A. A. Gould, of Boston, was announced by Dr. Gibbons.

---

## Regular Meeting, December 3d, 1866.

President in the chair.

Nineteen members present.

Donations to the Library:

Sechster Bericht des Offenbacher Vereins fur Naturkunde, 8vo., 1865. Jahrbuch der k. k. geologischen Reichsanstalt, xvi Band, No. 1., 8vo., Wien, 1866. Monatsbericht der königlichen Preussischen Akademie der Wissenschaften zu Berlin, Jan.–Mai, 1866, 5 parts, 8 vo., Berlin, 1866. Acta Universitatis Lundensis, 1864, 2 parts, 4to., Lund. 1864–5. Transactions of the Connecticut Academy of Arts and Sciences, Vol. 1, Part 1, 8vo., New Haven, 1866. Memoirs of the Boston Society of Natural History, 4to., Vol. 1, Part 1, Boston, 1866. Proceedings of the Academy of Natural Sciences of Philadelphia, Nos. 2 and 3, 1866, 8vo., Phil., 1866. Proceedings of the Essex Institute, vol. 5, No. 1, 8vo., Salem, 1866. Proceedings of the Boston Society of Natural History, vol. 10, Sheets 4–23, 8vo., Boston, 1866. Annals of the Lyceum of Natural History of New York, vol. 8, Nos. 6–12, 8vo., New York, 1865–6. Proceedings of the Chicago Academy of Sciences, vol. 1, Sheets 1–3, 8vo., Chicago, 1866. Proceedings of the American Academy of Arts and Sciences, vol. 7, 8vo., Boston, 1865–6. All the above were presented by the societies or authors named; and the foreign publications were received through the Smithsonian Institution.

Mr. Stearns exhibited specimens of *Petricola carditoides* and *Pholadidea ovoidea*, in unusually hard serpentine, collected by himself at Fort Point, San Francisco.

Professor Whitney read some extracts from letters just received from Mr. Rémond, giving an account of his geological explorations in Peru and Chile. Mr. Rémond has obtained a suite of plants from the coal-bearing formation of Northern Chile, sufficient in number to fix its age as Triassic. Two species, one a *Pecopteris*, the other a *Pterophyllum*, are apparently identical with those found with the coal near Los Bronces, in Sonora, Mexico, by Mr. Rémond. Above the coal-bearing conglomerates and sandstones, there are stratified porphyries, and above these, fossiliferous limestones of Liassic age. The fossils in this last mentioned formation are, in general, similar to those found by Domeyko and Darwin, at Las Juntas and Tres Cruces; but Mr. Rémond obtained several new species. He also collected a large number of species in the Tertiaries of Coquimbo and Caldera. Farther, he obtained fossils in sufficient numbers from the rocks in which are the famous silver mines of Chañarcillo and Tres Puntas, to fix their age as belonging to the Lower Cretaceous.

Professor Whitney commented on the importance of these investigations, especially that concerning the age of the Chile coal. It is very interesting to know that the same formation carries coal in Chile which has been found to bear that indispensable material in Northern Mexico. The vast extent over which Triassic rocks occur in Arizona, New Mexico, and Nevada, gives a peculiar interest to every discovery of this kind.

---

## Regular Meeting, December 17th, 1866.

President in the chair.

Twelve members present.

Dr. F. Hansen was elected a Resident Member.

Donation to the Cabinet: Skeleton of a Beaver, presented by Mr. S. Hubbard.

Donation to the Library: Ninety-six volumes and pamphlets chiefly on various branches of natural history, from the library of the late William Cooper, of New York, presented by J. G. Cooper, M.D.

## ANNUAL MEETING, JANUARY 7th, 1867.

Mr. Stearns in the chair.

Twenty-nine members present.

Dr. J. B. Trask was elected Life Member, and Dr. George D. Cleveland and Mr. George O. Whitney, Resident Members.

The Treasurer made a verbal Report. The Librarian and the Chairman of the Publication Committee made written reports, which were accepted and placed on file. The Curators of the various departments reported verbally. The Academy having moved twice during the past year, and the last time within a few days, the collections are of course in great disorder. The rooms now taken are those formerly occupied by the Academy, at 622 Clay street, and from which they were obliged to remove on account of the damage done to the building, by the earthquake of October 8th, 1865.

The following officers were elected for the year 1867:

PRESIDENT.

J. D. WHITNEY.

VICE PRESIDENTS.

LEANDER RANSOM.

R. E. C. STEARNS.

TREASURER.

SAMUEL HUBBARD.

RECORDING SEC'Y.

THEODORE BRADLEY.

CORRESPONDING SEC'Y.

W. B. EWER.

LIBRARIAN.

H. KELLOGG, M.D.

CURATORS.

W. S. KEYES.......MINERALOGY.
H. N. BOLANDER.......BOTANY.
W. M. GABB.....PALÆONTOLOGY.
E. F. LORQUIN........ZOOLOGY.
W. G. W. HARFORD..CONCHOLOGY.
H. BEHR, M.D......ENTOMOLOGY.

COMMITTEE ON FINANCE.

MESSRS. WHITNEY, HUBBARD, ASHBURNER, AND STEARNS.

COMMITTEE OF PUBLICATION.

MESSRS. WHITNEY, AYRES, AND STEARNS.

COMMITTEE ON THE LIBRARY.

MESSRS. JANIN, GIBBONS, AND KELLOGG.

COMMITTEE ON PROCEEDINGS.

MESSRR. KEYES, BOLANDER, AND BOSQUI.

Dr. Behr submitted specimens of microscopic crustaceans, of a brilliant red color, found upon the surface of a lake in Marin County; he remarked that they might be of some use in the arts, if they could be obtained in sufficient quantity.

---

## Regular Meeting, January 21st, 1867.

President in the Chair.

Twenty-three members present.

Governor R. C. McCormick, of Arizona, and R. C. Jacobs, of Chihuahua, were elected Corresponding Members, and Messrs. J. W. Kidwell, A. Sutro, A. T. Mason, H. C. Bidwell and H. P. Carlton were elected Resident Members.

Donations to the Library: Oversigt over det Kongelige danske Videnskabernes Selskabs Forhandlingar i Aaret 1864, 1 Vol., 8vo., Copenhagen. The same, 1866, Nos. 2–4. 32er Jahresbericht des Mannheimer Vereins für Naturkunde, 1 Vol. 12mo., 1866, (2 copies.) Mittheilungen aus dem Osterlande, 17er Band, 3 und 4 Heft, Altenburg, 1866. Jahreshefte des Naturwissenschaftlichen Vereins für das Fürstenthum Lüneburg, I., 1865, 8vo. Der Zoologische Garten, vii Jahrgang, Nos. 7, 9, 11, 12, 8vo., Frankfurt, 1866. Bericht über die XIV Versammlung der Deutschen Ornithologen-Gesells., 8vo., 1862. Sitzungs-Berichte der Naturw. Gesells. Isis in Dresden, Jahrg. 1866, 8vo., Dresden. Jahrbuch der k. k. Geolog. Reichsanstalt, Jahrg. 1866, No. 3, 8vo.; Wien. Abhandlungen herausgegeben vom Naturw. Vereine zu Bremen, I Bd. 1 Heft, 8vo., Bremen, 1866. Journal de Conchyliologie, 3me Série, Tome vi., Nos. 3, 4, 8vo., Paris, 1866. On the Osteology and Myology of Colymbus Torquatus, by R. Elliot Coues, (Mem. Bost. Soc. Nat. Hist., Vol. 1, Part ii.) 4to., Cambridge, 1866. Journal of the Royal Hortic. Society of London, Vol. 1, Part 4, 12mo., 1867. Same, Proceedings, Vol. 1, N. S., No. 6, Aug., 1866, Jan., 1867, 12mo., London. Zeitschrift der Oesterreichischen Gesells. der Meteorologie, 1 Band, 1866. Sitzungsberichte der Königl. bayer. Akademie der Wissenschaften zu München, 1865, II, 3–4; 1866, I, 1–4; II, 1, 8vo., Munich. Die Bedeutung moderner Gradmessungen, von Bauernfeind, 4to., pamphlet, München, 1866. Verzeichniss von 9412, Æquatorial-Sternen, ein Sup. Band zu der Ann. der Münch. Sternwarte, 8vo., Munich, 1866. Resultate Magnetischer, etc., Beobachtungen auf einer Reise nach dem östlichen Sibirien 1828–30, von Prof. C. Hansteen and Lieut. Due, 4to., Christiania, 1863. Hansteen, Magnetismus der Erde, 1 Theil, 4to., Christiania, 1819, with plates separate. Meteorologiske Iagttagelser paa Christiania Observatorium, 1865, long 4to., Christiania, 1866. Mœrker efter en Jistid i Omegn af Hardangerfjorden, af S. A. Sexe, 4to., pamphlet, Christiania, 1866. Bidrag til Bygningskikkens Udvikling paa Landet i Norge, 1ste Hefte, 4to., pamphlet, Christiania, 1865.

Dr. Kellogg exhibited specimens of *Thaspium cordatum*, (Heart-leaf Meadow Parsnip) a plant which has become somewhat known in cases of chronic rheumatism, and which is common on this coast. He remarked that it might be mistaken for *Sanicula*, (Sanicle) or possibly for *Conium maculatum* (Poison Hemlock).

Dr. Kellogg also presented specimens of a beautiful Alpine willow-herb collected by Mr. Blanchard, of Brooklyn, Alameda County; it was found in the mountains west of Owen's Lake, near the Kearsarge mines, at an altitude of 8,000 feet. He considered it a variety of *Epilobium obcordatum*, Gray. This plant is described in the Proc. Am. Acad. of Arts and Sciences for May, 1865.

Dr. James Blake read the following communication:

## On the Nourishment of the Fœtus in the Embiotocoid Fishes.

BY JAMES BLAKE, M.D., F.R.C.S.

I am not aware that the process by which the embryo of the Embiotocoid fishes receive the nourishment necessary for its growth, has ever been pointed out. It certainly differs from the three most common forms in which the embryo of other animals is nourished, as there is nothing like a placenta by which they can receive nourishment from the mother; there is no supply of nutriment surrounding the embryo, as in the case of most oviparous animals, nor is the embryo brought into direct contact with the water, so as to derive nourishment by absorption from the surrounding medium, as is the case in oviparous fishes generally and in most of the lower forms of animal life. The young fish is contained in a uterus which, in the undeveloped state, resembles very much the ovaries of the common oviparous fishes, except that its walls are thicker, and that the number of ova it contains is very much smaller. In the interior of the uterus, projecting from its sides, are a number of processes analogous to those to which the ova are usually attached. These processes vary in number in different examples, but they are so arranged that each fœtal fish is in contact on every side with a surface of one of these processes. They consist apparently of a membrane composed of a cellular tissue, and scattered over their surface are a number of small mammillary elevations with an orifice in the center, and which are probably the organs by which the peculiar secretion of the uterus, to be hereafter noticed, is poured out. In an example I examined, in which impregnation had apparently just taken place, numerous ova were found adhering to these processes, although not at all in such numbers as in the ordinary fishes. I counted thirty-eight in about the space of an inch; of these, however, but few can be developed, as the number of fœtuses seldom exceeds forty, and sometimes is only eight. In the whole of the uterus there probably were from one hundred to one hundred and fifty ova. Of the earlier stages of development, however, it is not my object to treat in the present memoir, as I did not commence my investigations sufficiently early to be able fully to make it out. As soon, however, as the embryo has advanced sufficiently for the fins to be formed, these appendages are found to be terminated by a number of digitations, which project from the free edges of the fin, and are usually found situated, one between each ray or spine. They are composed almost entirely of fine capillary blood-vessels, united apparently by a very delicate and structureless membrane. They are so delicate that unless great care is taken in removing the specimen from the uterus, they are destroyed; nor have I ever been able to discover them in specimens that have been preserved in alcohol. These processes seem continuous with the membrane extended between the rays of the fins, but are much more delicate; they project from the free edge of the fin, sometimes as much as the eighth of an inch, and are, in the fully developed embryo, the fifteenth of an inch broad. On the free margin of each digitation, a larger capillary can be observed, which appears to be continuous all around; it is about the .003 in. in diameter, the intermediate space being filled with a net-work of smaller capillaries. This system of digitations projects from the entire edge of the dorsal, ventral and caudal fins, but not from the pectorals. They in fact form a fringe round the entire body, with the exception of the head and that part of the abdomen in front of the anus.

Such is the structure of the organ that evidently has some connection with the nourishment of the fœtus, resembling as it does so closely the early formation of the vascular villi and the placental tufts that proceed from the chorion of the mammiferous embryo, and through which it derives its nourishment before the placenta is fully formed.

The question now presents itself as to how nourishment is conveyed from the parent to the fœtus through these tufts? As before stated, the lining membrane of the uterus sends off processes which surround each fœtus, without however forming sheet sacks; but although these processes are very freely supplied with blood-vessels, yet the finest injection failed to show any more vascular spots where the fœtal digitations might have been brought into more immediate contact with the blood of the parent. I however was fortunate enough to obtain a fish, in the uterus of which I discovered a considerable quantity of fluid, and on collecting it, and submitting it to chemical tests, I found that this fluid contained a considerable quantity of an animal substance, resembling, to a certain extent, some of the compounds that are formed from albumen during the process of digestion. The fluid was of yellowish color, translucent, deposited on standing some small globules which under the microscope strongly refracted the light, were not altered by acetic acid, but dissolved in ether; probably fat globules; when heated, there was no coagulation, although the fluid was not quite so clear; solution of $Hg\ Cl_2$. caused no precipitate; tannin in solution caused a yellowish precipitate. In adding ether to a portion of the fluid, there was a free disengagement of gas, a white flocculent precipitate was formed, and on allowing the vessel to stand, the fluid separated itself into three

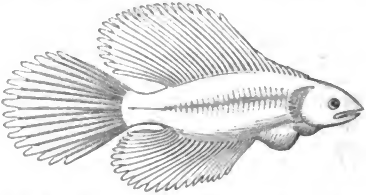


Fig. 30. A Fœtal Fish, about two-thirds grown, slightly enlarged.

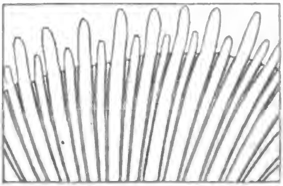


Fig. 31. A portion of Dorsal Fin of an almost mature fœtal fish, about double the natural size.

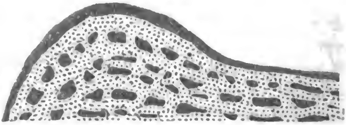


Fig. 32. A portion of a Digitation, magnified about 150 diameters, showing capillaries.

portions: the upper portion consisting of pure ether apparently, then a layer containing white flocculi, which occupied about the fourth part of the fluid, and below this the remains of the original fluid, but little altered in appearance. There can, I think, be little doubt but that it is through the medium of this fluid that the fœtus obtains its nourishment. The considerable portion of animal matter it contains, and that too in a state particularly fitted for absorption and for conversion into tissue, fits it for furnishing the fœtus with the elements necessary for its growth by absorption through the large surface of capillary vessels which are found in the vascular digitations that surround the fœtus, and which are constantly bathed in the fluid. The difficulty that up to the present time has attended every attempt to trace the connection between the parent and fœtus in these embiotocoid fishes, is owing, in the first place, to the extreme delicacy of the vascular digitations of the fœtus, which prevents their being observed in preserved specimens, and also to the fact that in almost every case the fluid secreted by the uterus is entirely expelled by the violent struggles of the fish when removed from the water, so that it was almost by a rare accident that I succeeded in obtaining any. I hope, however, during the coming season, to be able more fully to carry out these researches.

SAN FRANCISCO, January 21st, 1867.

Mr. Bolander exhibited the cones of many species of pines growing in this State, and stated what was known concerning the peculiarities of the different species, and their geographical distribution.

He stated that the pines of California comprise sixteen true species, which he described briefly. There are twenty synonyms for these species, which have created some confusion as to their real name and number. The correct names of all, with the popular characteristics of the most striking, and their distribution, are given herewith. The names marked thus * are those of trees having persistent cones, which they retain from ten to twenty years in some instances. Those marked thus † retain their cones but two years. Those marked thus ‡ retain them but one year:

*Pinus insignis*.*—Well known as the ornamental Monterey pine, which is much cultivated in San Francisco.

*P. muricata*.*—Not remarkable.

*P. contorta*.*—Small and bushy, but valuable as shelter against wind. Grows abundantly near Fort Bragg, in the Mendocino country, where it makes the stoutest wind-proof hedge known. Ought to be tried in San Francisco.

*P. tuberculata*.*—Always small, seldom higher than 15 to 30 feet.

*P. ponderosa*.‡—The well known yellow pine. Attains a height of 225 feet and more, and a circumference of 23 or 24 feet.

*P. Lambertiana*.*—The equally well known, larger and handsome "sugar pine," or "long-cone pine" of Fremont. Usually grows at great altitudes; exceedingly valuable for timber, and affords the principal supplies.

*P. Coulteri.*†—Found in the lower eastern slope of the Coast Range. Not very large; sometimes attains a height of 75 feet; knotty, but ornamental. It is remarkable for having the largest cone of all the pines, and specimens of its cone, when first known, brought five guineas in England.

*P. Sabiniana.*†—This is the nut pine of the foothills, sometimes called the "scrub pine," or "silver pine." The Digger Indians gather the nuts from its cone as a favorite article of food. It is found on the foothills of both Coast Ranges and Sierra Nevada.

Mr. Bolander mentioned several species in the group of coast pines which he had not seen, viz: *P. Llaveana*, east of San Diego; *P. deflexa*, on the summit of the California Mountains; *P. Torreyana*,* near San Diego.

*P. monticola.*‡—A tall tree and affording fine timber; said to be hardier than the sugar pine, and might be preferred if its position near the summit did not make it difficult of access.

*P. flexilis.*‡—This grows on windy heights in the form of a low shrub, so stout and thick that a man can stand on its top. In low altitudes it reaches a height of a hundred feet. It is useful only for firewood.

*P. monophylla.*—This is a stunted, twisted tree, which grows on the eastern slope of the Sierra, where it corresponds to the nut-pine on the western slope. At a distance it resembles in shape the live oak. Its cone is ill shapen and has an offensive odor, but yields a sweet nut.

*P. Balfouriana.*—This species is found near Scott's Valley, in Northern California.

Five species in the above list—*insignis, muricata, Llaveana, deflexa* and *Torreyana*—are peculiar to the sea coast. Five species—the *contorta, ponderosa, Lambertiana, Sabiniana, tuberculata* —are found both in the Coast Ranges and Sierra Nevada. The *Coulteri* is found only in the Coast Range, eastern slope; the *monticola* only high in the Sierra; the *flexilis* only on the upper Sierra and western slope of the same; and the *monophylla* only on the eastern slope.

---

## Regular Meeting, February 4th, 1867.

President in the Chair.

Twenty-eight members present.

Messrs. Joseph P. LeCount, C. Von Liebenau, Amory F. Bell, W. C. Walker, George H. Powers, Thomas Bennett, M.D., L. Gilson, Delos J. Howe, R. S. Williamson, U. S. Engineers, R. D'Heureuse, Rev. John F. Harrington, H. C. Hyde, G. B. Hitchcock and Jacob Bacon were elected Resident Members.

Donations to Library: Review of the Mining, Agricultural and

Commercial Interests of the Pacific States, from J. H. Carmany. Essai Politique sur la Nouvelle Espagne, by A. de Humboldt, 2 Vols., 4to., and atlas folio, Paris, 1811, presented by A. Sutro.

Professor Whitney read the following communication:

## On the Fresh Water Infusorial Deposits of the Pacific Coast, and their Connection with the Volcanic Rocks.

BY J. D. WHITNEY.

The microscopic discoveries of the last few years have immensely extended the range and importance of the minute, and, to the naked eye, invisible organisms, which, under the general designation of "Infusoria," are recognized as a part of the kingdom of nature. It is especially to Ehrenberg that we are indebted for a demonstration of the geological importance of the Diatoms, those microscopic organisms which so long puzzled naturalists to decide whether they were animal or vegetable in their nature, but which are now, by the majority of zoölogists, referred to plants. In Ehrenberg's great work, the "Mikrogeologie," or geology in little, this eminent naturalist has given the results of the examination, by himself, of specimens of infusorial rocks, soils, ashes, dust, and other accumulations or masses of matter from every quarter of the globe: these investigations show most conclusively that deposits of vast extent—of such magnitude, indeed, as to form no inconsiderable portion of the earth's crust—are the result of organic agencies, and that what seems to the eye an unorganized mass, may in reality be made up of the delicately wrought and almost infinitely minute remains of plant or animal life.

That animals, or plants, so minute that a hundred millions of distinct individuals will scarcely weigh a single grain, should form accumulations hundreds of feet in thickness and extending over thousands of square miles, seems a hardly credible statement; but a fact still more difficult to believe and comprehend is one which is thoroughly established by abundant evidence, namely: that immense deposits of volcanic materials, or, at least, of materials closely connected in their origin and nature with volcanic action, and spread over vast tracts of country in different parts of the world, are also, to a large extent, made up of these microscopic organisms, the existence of which seems dependent on the presence of water, and so utterly at variance with a condition of volcanic activity.

Throughout this volcanic region of California, Oregon, Nevada, and probably as far north as the igneous masses extend, which are well known to cover a vast area on the western side of our continent, there are found deposits, which are usually called "fire-clay," "kaolin," "pipe-clay," or simply "clay;"* these masses are, however, not at all of the nature of kaolin, nor are they proper clay, although they may, in places, pass into clay or shale.

---

* They are also frequently called "magnesia," and have been repeatedly stated by "assayers" in San Francisco to be made up of that earth.

The material of which this deposit is made up is exceedingly fine-grained, seemingly an impalpable powder, usually perfectly white and more or less distinctly stratified. It is extremely light, and resembles commercial magnesia more than anything else. In its geological position, it is found underlying the basaltic masses, or the products of the last great eruptive action of the Sierra Nevada. It is often associated with, or intercalated among beds of gravel, fine or coarse-grained sandstone and shales, and bears the evident marks of being a sedimentary deposit made along the sides of a gently-descending broad valley, or lake-like expansion of a valley. This is its character in the Sierra Nevada; but as we go north and northeast, and come on to the great volcanic table lands of Northern California and Southern and Eastern Oregon, we find the thickness of the deposits of this kind of material increasing, and the area occupied by them more considerable. The following localities are especially worthy of notice: North of Virginia City, Nevada; Surprise Valley; Pit River, near mouth of Canoe Creek; Klamath Basin, or in the vicinity of Wright, Rhett and Klamath Lakes; the Des Chutes Basin.

Of all the localities, the last mentioned would seem to be the most remarkable for the extent and thickness of the deposits in question. It was from here that the first specimens examined by Ehrenberg, in 1849, were brought by Frémont, who represented the deposit as 500 feet thick. This region has since been examined by Dr. Newberry, who describes the cañons of the tributaries of the Des Chutes as in places 2,000 feet deep, the plateaux between which cañons are covered by basaltic lava, and this is seen, in the magnificent sections thus presented, to rest on a thickness of hundreds of feet of tufaceous strata interstratified with a variety of beds of volcanic conglomerates, pumice sand, ashes, etc. Dr. Newberry speaks of tufaceous strata 1,200 feet in thickness, in the cañon near the mouth of the Mptolyas River.

The white material, of which some of the more prominent localities have been indicated above, and which is well known to explorers under so many names, as already mentioned, is in reality chiefly of a silicious character, and made up, to a large extent, of organic bodies of microscopic dimensions, infusoria, or *Diatomaceæ*. This fact was first recognized in the case of the specimens collected by Frémont on the Des Chutes River, and examined by Bailey and Ehrenberg. Specimens collected by Dr. Newberry, on the Pacific Railroad Survey, were also examined by Professor Bailey, but I am not aware that any detailed description of the results was ever published.

Among the collection of the Geological Survey are a large number of specimens of the white infusorial deposit, underlying the lava at various localities. Of these a preliminary examination has been made by Professor Brewer, and a large supply of material is now in the hands of Mr. A. M. Edwards, of New York, for a detailed examination and report. The fact has been already well demonstrated that all or nearly all these fine, white, light masses are made up, to a large extent, of the silicious remains of the *diatomaceæ*, and in all cases of forms peculiar to fresh water. The geological position of these beds is extremely recent. They extend from the latter portion of the Pliocene into the

Post-pliocene epoch, and seem to have continued their existence nearly, if not quite, down to the present day.

So far the facts are very simple, and the principal results of our detailed microscopic examination of these infusorial deposits will be, the knowledge of the range of the different species which occur in them, and the relations of the various forms to those now living, either in this region or in other parts of the world. This the extent of our collections will give us better opportunities to do than others have yet had.

There is a point, however, of great interest connected with these deposits, in regard to which I desire to make some remarks at this present time, and on which I consider that our explorations are capable of throwing some light.

Ehrenberg has recently* examined a specimen collected many years ago, in the Toluca Valley, Mexico, by the well-known mining engineer Burkart, of what he denominates a "Phytolitharien Tuff," or phytolithic tufa, and which came to him labeled "Trachytic Tufa, from Toluca Valley, *quere*, whether pumice-like or infusorial." Of this, Ehrenberg says: "It is a silver-gray, easily crumbled, gritty tufa, which does not effervesce with acids, and which, when heated, becomes darker, but not black, and then assumes a light-brownish color." The microscopic analysis of it showed that it was made up to a large extent of phytolitharia, which probably belong chiefly to the grasses, and between them lie scattered a comparatively small number of bacillaria. All are fresh-water forms.

In his remarks on this material, Ehrenberg recalls the other specimens of infusorial tufas, which have been examined by him, at various times, since 1839. He mentions particularly the rock from the Des Chutes River, collected by Fremont; also trachytic tufa, with organic remains, from Honduras; trachytic tufa from the volcano Maibu, in Chile; the mud-ejections (?) of the volcanoes near Quito; the ejections (?) of the volcano Imbabaru, as well as those from the island of Guadaloupe.

In regard to the Des Chutes River deposit, it may be incidentally remarked that the eminent microscopist seems to assign to it a much greater geological age than it really deserves; it is, unquestionably, as recent as the latter part of the Pliocene.

It would appear from what Ehrenberg has published, that he considers this occurrence of organic forms, in connection with reputed volcanic masses, to be something extremely difficult to explain, as indeed it is, if we adopt the view taken by him, namely, that these so-called tufaceous materials are the direct products of volcanic action; that is to say, that they have been ejected from craters, either in the form of showers of ashes or of mud out-flows. It would be, indeed, to my comprehension, something entirely inexplicable, that such vast masses of matter, made up to a large extent of organic forms, should be poured forth from the interior of the earth. This would be the case, as it appears to me, no matter what theory of volcanic action one might choose to adopt; since, whatever may be the cause, no one will deny that a high temperature is, at least, one of the results. That Ehrenberg really considers these infusorial deposits to be of eruptive origin, is evident from a remark in his last communication, (that in reference to the specimen from the Toluca Valley) to the effect that the occurrence of fresh-water forms, exclusively, in these infusorial masses is evidence that volcanic phenomena are not dependent on, or connected with, the presence of sea-water, as is generally supposed, from the fact that volcanoes are situated, in most cases, near the sea coast.

---

* See Monatsbericht der Kön. Preuss. Akad. zu Berlin, 1866, page 158.

Not having the necessary works of reference at hand to be able to see, in all the cases cited by Ehrenberg, exactly what the evidence is, on which his theory of the origin of these infusorial deposits is founded, I will not attempt to give an authoritative statement in regard to any others than those which belong to this coast; but I cannot avoid drawing the inference, that the same conditions which are so easily traced here will, on future examination, be found existing in all the other localities cited by him.

The mode of occurrence of these fresh-water infusorial deposits in California, and on the Pacific coast in general, is very simple. They are accumulations of organisms which have been collected at the bottom of the lakes, or in the lake-like shallow expansions of rivers, in which they grew. This growth took place at a time when volcanic agencies were busily at work, giving rise to accumulations of ashes, pumice, and other materials. The rapidity with which these infusorial deposits form, at the present time even, the vast extent over which they are distributed, and the general importance in the geological history of the earth, are now matters which are well understood, of the masses thus accumulated and in regard to which the store of facts has been rapidly growing in magnitude during the past few years. The mud deposits and deltas of rivers, the bottoms of lakes and swamps, and the bed of the ocean itself, are the repositories of these forms. Heat and stagnant water seem to be what is required for their rapid reproduction and the consequent rapid accumulation of their remains.

The infusorial deposits of Central California—I refer now to those of fresh water origin, and connected with volcanic masses—are all situated in such positions as to show, that they were formed and deposited in shallow water; that, through the various alternations of calm and convulsion in the Sierra, they were at one time allowed to accumulate in quiet, then swept over by masses of gravel and sand, indicating a furious rush of water, then covered with a shower of ashes and pumice from the neighboring volcanoes of the Sierra then in active operation; and finally, at the grand finale of the basaltic lava overflow of the chain, capped with this indestructible material, which has effectually prevented the washing away of the otherwise easily removed infusorial deposits. This is the connection between the volcanic and the infusorial masses; by their absolute indestructibility the former have protected the latter from denudation, and consequently we see them always accompanying each other: for where the cover did not exist, there the denuding forces have swept away every vestige of the soft and easily yielding material, or else it remains concealed under the water. To form an idea of the extent of the erosion which has taken place since these infusorial beds were deposited, and the consequent change in the configuration of the country, we must bear in mind that the whole of the present river cañons on the west slope of the Sierra have been excavated since that time, and that, in many places, the strata have been removed to a vertical depth of between two and three thousand feet.

Everything shows that the surface covered by fresh water in the region east of the crest of the Sierra was, at a not very distant epoch, much greater in extent than it now is. There existed, probably during or immediately after the glacial epoch, a chain of great lakes occupying a large portion of the country from Walker's Lake to the Des Chutes River, a distance of about four hundred miles, and extending over a breadth of not less than one hundred. A large portion of this region is now a volcanic plateau; and, where cut into by the force of running water, the deposits of infusorial strata may be seen, sometimes thin and unimportant, but often of great thickness. Observations and measurements of terraces and determination of the altitude of all these old lake deposits will enable us at some future time to indicate on the map the area once occupied by this great chain of inland seas. The vast extent of the lacustrine infusorial formations on the east side of the Sierra is thus accounted for, as well as the comparatively small area which they cover on the western slope.

In addition to the stratigraphical reason given above why the infusorial strata should occur connected with eruptive masses, there may be a chemical one which shall, in part, account for the apparent great development of the *diatomaceæ* in volcanic regions. These organisms require an amount of silica, infinitesimally small for each individual, but in reality enormous for the number of organisms required to develop themselves over the vast area and with the thickness which they occupy. That a volcanic region should supply a larger amount of silica in the state in which it can be appropriated by the *diatomaceæ*, is extremely probable. We know that silicification of all organic matters occurring in these volcanic regions of our coast proceeds with the greatest rapidity, and has taken place on an extensive scale. The thermal springs contain a great amount of free silica, and it is in the vicinity of such springs that large infusorial deposits are frequently found. It seems that it could only be in regions particularly favorable for the secretion of their silicious coverings, that these infusoria could be accumulated with such rapidity as to form what may be called, without exaggeration, mountain masses. It is also possible that temperature may have something to do with this rapid development, and that volcanic regions may on this account be favorable to it.

To my apprehension, the phenomena of infusorial deposits in connection with volcanic masses admit of an easy explanation on this coast, at least; and I can hardly believe that any of the localities of *diatomaceæ*, if closely examined, would present any such difficulties as to make the assumption necessary that they have been ejected from the interior of the earth. In cases where infusoria seem to have been actually ejected from craters, as is said to have been the case in some of the South American volcanoes, it is not difficult to understand that an ancient crater may have become filled up and temporarily converted into a lake; and that, after the growth and deposition of an infusorial deposit at the bottom, a new eruption may have broken out in the same place as a previous one, or in its immediate neighborhood. In such a case, among the ejected material, a large quantity of the infusoria would be found mingled with the ashes, which must pass through the material collected in the bottom of the crater as they rise from the interior of the earth. The bursting of lakes at the bases of volcanic cones, caused by the rapid melting of the snows above them, have often given rise to torrents of volcanic mud, called "Moya" in South America, in which both animal and vegetable remains are often inclosed in great quantity; but the connection between the organic and inorganic phenomena, in such cases, is perfectly evident.

In fact, I see no reason for suspecting any connection between the infusorial deposits and the volcanic masses of this coast, or of any other part of the world, which should influence the geologist in forming an opinion with regard to the cause or the locality of volcanic action.

In conclusion, it may be remarked that the marine infusorial rocks of the Pacific coast, and especially of California, are of great extent and importance. They occur in the Coast Ranges, from Clear Lake to Los Angeles. They are of no little economical, as well as scientific, interest; since, as I conceive, the existence of bituminous materials in this State, in all their forms, from the most liquid to the most dense, is due to the presence of infusoria—the proofs of which statement I will, at some future time, endeavor to set before the Academy.

Dr. Kellogg read a paper on "Fungi," in which he gave a full account of their nature, distribution, and uses.

Mr. Lorquin exhibited two ducks, and made some remarks in regard to them. One of them he considered a hybrid between the Pintail and the Mallard, and the other between the Pintail and the Teal.

Mr. Falkenau gave an account of the chemical reactions of the red matter exhibited by Dr. Behr to the Academy, at the meeting of January 7th. The quantity was too small for a satisfactory result.

Dr. Stivers made some remarks on the *Nereocystes Lütkeana*, one of the Algæ, and remarkable for its absorptive power.

## REGULAR MEETING, FEBRUARY 18th, 1867.

President in the Chair.

Twenty-five members present.

Messrs. I. W. Raymond, Rodmond Gibbons, Thomas H. Selby, Daniel Knight, F. A. Holman, M.D., Edmund Scott, Henry Edwards, John Melville, George Daly, Robinson Gibbons, Gregory

Yale, James Howden, George H. Fillmore, Marshall Hastings, John L. Eckley and Lee J. Ransom were elected Resident Members, and J. G. Cooper, M.D., a Life Member.

Donation to the Cabinet: A skull of a California Indian, taken from a burial place in Alameda County, near Centreville, by Mr. L. G. Yates.

Donation to the Library: The Pacific Medical and Surgical Journal for 1865 and 1866, by Dr. H. Gibbons.

Prof. W. P. Blake read the following communication:

## Notice of Fossil Elephants' Teeth from the Northwest Coast.

BY W. P. BLAKE.

The two molar teeth of the extinct elephant which I exhibit this evening were presented to me by Col. Bulkley, Superintendent of the American and Russian Telegraph. One is from the mouth of the Yukon River, and the other from St. Paul's Island, near the middle of Behring's Sea. The remains of elephants are abundant in both places. Tusks are sometimes found, and one has been sent by Col. Bulkley to the Smithsonian Institution. These new localities may be regarded as forming a connecting link between those of Siberia and America, and indicate the former continuous distribution of the ancient elephant upon the two continents.

The following list of localities, known to me, of similar fossils in California, will show that the elephant must have been frequently seen here in very early times: At Mare Island; in Placer County, near Forest Hill; in Tuolumne County, at Columbia, Shaw's Flat, Texas Flat and near Sonora; in Calaveras County, at Knight's Ferry; in Los Angeles County, at San Pedro. The last is, I believe, the most southern point at which such remains have been found in this State.

Mr. Falkenau read a paper on Peat, in which he gave an account of the origin, distribution and uses of this material. In the discussion which followed the reading of this communication, it was stated by Mr. Bolander that no valuable beds of peat had yet been discovered on this coast. Messrs. Keyes and Behr also commented on supposed discoveries of this material in California. The peculiar climate of this region was noticed as unfavorable to the development of this material.

Dr. H. Gibbon made some remarks on the simultaneity of storms on both sides of this continent.

Prof. Whitney made some remarks supplementary to his communication to the Academy in 1862, on the question—" Which is the highest mountain in the United States, and which in North America?"

He remarked that but little had been done, outside of California, during the last five years, towards improving our knowledge of the topography of the western part of our continent. Some valuable contributions to the physical geography of the central portion of the eastern edge of the Rocky Mountains, have been published by Drs. C. C. Parry and Engelmann in the Transactions of the St. Louis Academy, (1863 and 1866) and several peaks were measured by Dr. Parry; but of these only two are located on any map, namely: Long's and Pike's. Of these Long's Peak is 13,456 feet, and Pike's, 14,215; this latter being the highest summit in the Rocky Mountain range, at least within the borders of our own territory. Of the continuation of the Rocky Mountains north into British Columbia, but little is known. Some peaks are said to be 16,000 feet and over in height; but it is believed that no accurate measurements have been made in that region; and, further, it is not at all in accordance with what we have learned of the relation of peaks to passes in other mountain chains, to suppose that when the passes are as low as 5,000 feet, the mountains on either hand should rise to an altitude of 16,000 feet. This would be more probable were the high points volcanic cones; but this they are not supposed to be. Lord Milton and Dr. Cheadle's book, recently published, gives no information as to the height of the peaks near the pass traversed by their party, (the Leather Head Pass) except a statement that one point, far exceeding all others in elevation, was "from 10,000 to 15,000 feet high."

Professor Whitney referred again to the fact that the height of Mt. St. Elias, as given on the British Admiralty charts, and probably from Sir Edward Belcher's measurement, namely, 14,970 feet, was still ignored by all compilers of gazetteers and geographies, even down to Ansted's latest work, published in 1867. The old figures, 17,854 feet, obtained from an old Spanish document found in Mexico by Humboldt, have been shown to be grossly exaggerated by two separate measurements of more modern times.

The recent measurement of Mt. Hood by Mr. A. Wood, was mentioned, and several reasons given why little weight should be attached to it. If Mr. Wood's measurement were correct, the height of Mt. Hood must be nearly 4,000 feet greater than that of Mt. Shasta, and so notable a fact would have been clearly recognized by explorers, as it always has been that Mt. Shasta itself is nearly that much higher than Lassen's Peak. But, on the other hand, experienced observers have stated that Mt. Hood was not as high as Mt. Shasta, nor as Mt. Adams, or Mt. Rainier, this last-named peak being, according to Wilkes, only 12,300 feet. Again, Mt. Hood was roughly measured by Dr. Vansant, and his result (11,934 feet) gives the height of that mountain as less than that of Mt. Adams, also measured by him with the same instrument, and this instrument could hardly have been so rough and liable to error as the one employed by Mr. Wood. Further, this last-named gentleman gives the limit of forest vegetation on Mt. Hood as 9,000 feet, while our careful observations on Mt. Shasta place it on that mountain, at 8,000 feet. It is certainly contrary to what we have everywhere on this coast observed, to suppose that the limit to which arboreal growth reaches, should not fall considerably in going north three hundred miles, rather than rise 1,000 feet, as would be the case if Mr. Wood's measurements were correct. Finally, that Mr. Wood's figures are not very reliable is shown by the fact, that on plotting his estimates of distances traveled and the angles of the slopes as given by him, it was found that, to correspond with his statements, the mountain must be no less than 33,400 feet high.

Finally, Professor Whitney concluded that we have as yet no satisfactory evidence to invalidate the statement previously made by him, that we have in California the highest mountains in the United States, and the grandest and largest mountain mass in North America, although one or two of the volcanic cones of Mexico rise to higher altitudes than any of our peaks.

Prof. Whitney also exhibited one of the short barometers made for the Geological Survey, by James Green, of New York. Having had occasion to work at high elevations—the party being sometimes, for weeks together, camped at from 8,000 to 10,000 feet above the sea—it has been found that the vacuum in the ordinary barometer tubes soon becomes deteriorated, and the mercury dirty from the constant lowering and raising of the column, which is required when a large number of observations are taken at so great an elevation. By having the barometer tube made only long enough to commence the reading at about twenty-four inches, or at an elevation of 6,000 or 7,000 feet, the difficulty above specified is to a great degree avoided, and the instrument made much more portable and convenient to carry, especially on peaks so steep that both hands are needed to aid in climbing. Two of these short barometers have been used in the high mountain work of the California Survey, and found extremely convenient. Of course the short barometer must be compared with a long one at some station camp of sufficiently great elevation to allow this to be done.

Dr. Gibbons made some remarks on the inferior quality of the macadamizing material employed in this city. He inquired if any person knew of the existence of any better stone for this purpose, in the vicinity of San Francisco. Prof. Whitney replied that an excellent basaltic rock was to be had in great abundance near Petaluma, at a point convenient for shipment, and that there was no really valuable rock for macadamizing to be had nearer than this point.

## Regular Meeting, March 4th, 1867.

President in the Chair.

Twenty-nine members present.

Messrs. J. M. Sibley, William Norris, Henry Pickel, John W. Nystrom, Ross E. Brown, Cornelius B. Miller and Theodore P. Painter were elected Resident Members.

Donations to the Cabinet: "Electro-Silicon," (Infusorial Silica) from Six-Mile Cañon, near Virginia City, Nevada, from Dr. Lanszweert; Fossil Fruit, from Long Valley, Mendocino County, from C. Beottie; Fossil Shells, from the line of the Erie (Steuben County, N. Y.) Railroad, by A. T. Beardsley; Magnesium Wire, by C. Z. Wilson; Fragment from the "Pyramid of Cheops," by Mr. Elliott; Two Specimens of Petrified Wood, from Sonoma County, Package of Coffee Seed and Specimen of Nest of Trap-Door Spider, from Dr. Kellogg.

Prof. Whitney announced the death of Alexander Dallas Bache, and read a notice of his life and eminent scientific services.

Mr. Stearns read the following communication, prefacing it with some remarks on the hibernation and æstivation of land shells:

### Remarkable Instance of Vitality in a Snail.

In that invaluable work to the conchological student, entitled "Recent and Fossil Shells," by S. P. Woodward, pp. 18 and 19, reference is made to certain genera and species of land shells, and several instances are cited proving the remarkable vitality of these comparatively insignificant animals, and their ability to exist for great lengths of time without food.

Particular mention is made of a specimen of the snail *Helix desertorum*, which was affixed to a tablet in the British Museum, March 25th, 1846, and upon the 7th of March, 1850, it was observed that the animal must have come out of the shell, as the paper was discolored in the attempt to get away, but finding escape impossible, it had withdrawn inside of the shell and closed the aperture with the usual glistening film, which led to its immersion in tepid water and marvelous recovery. It will be noticed that this period embraced nearly four years.

A more remarkable case has come under my observation, which is worthy of mention.

Dr. Veatch, a member of this Academy, visited Cerros or Cedros Island, opposite the west coast of Lower California, and upon his return, in the year

1859, brought home, among other shells, a species of Helix, supposed to be new, described by Dr. Newcomb, of Oakland, and to which the latter gave the name of *Helix Veatchii;* many specimens of this species were obtained, and some of them were given by Dr. Veatch to the late Thomas Bridges. Mr. Bridges died in September, 1865, and in December of the same year a portion of his collection passed into my hands, including the same specimens of *Helix Veatchii* to which I have before alluded. Judge of my surprise, when one day, upon a careful examination, I detected a living specimen, which, after being placed in a box of moist earth, in a short time commenced crawling about, apparently as well as ever. Fearing from itsactivity that by some accident it might crawl away, and I might thus lose it, after a fortnight's furlough from its long imprisonment, I placed it in a pill-box, marking the date of its reimprisonment upon the cover, in order that at some future time I may examine it, and ascertain possibly, if it does not outlive *me,* how long a snail can live without rations.

Here is an instance of a snail living at least *six* years—in Californian parlance, without a single "square meal."

## Mr. Bolander made some remarks in regard to the botanical collections of Mr. Alphonso Wood, in California and Oregon, in 1866.

Mr. Wood claims to have collected in five months, in California, 1,490 species of flowering plants, as appears by a letter over his own signature in the San Francisco Bulletin; furthermore, he also asserts, that during his whole journey in California and Oregon he collected 15,000 specimens, representing 2,794 species of plants. This journey occupied about eleven months, including the time spent in coming from and returning to the East. The route of Mr. Wood was from San Diego north, through the regions which have been most thoroughly collected over and studied by botanists, namely, along the stage road to Los Angeles and San Bernardino, then to San Louis Obispo, Santa Cruz, and north through the Sacramento Valley, past the base of Mount Shasta, and along the stage road to the Columbia River. Mr. Bolander considered it probable that there were not over 500 species of flowering plants actually existing in that part of California explored by Mr. Wood, and in which he professes to have collected 1,490 species. According to Professor Brewer's careful investigations, it appears that over fifty botanists have collected in California and Oregon, during a period extending back for more than seventy years. Some of these collectors were engaged for years in the business, and had far greater facilities at their command than those enjoyed by Mr. Wood, and they have jointly thoroughly explored a far greater area than that even hastily passed over by him. Yet, the sum total of all the species obtained, up to the time of Mr. Wood's visit, is only about 1,800 species, while he claims to have found 2,794; that is to say, nearly 1,000 species more than had been brought to light by fifty persons in seventy years. The absurdity of Mr. Wood's claims is self-evident. But, a comparison of his figures with those of Eastern botanists will throw still further light on this subject.

Professor Gray enumerates, in his manual, only 2,426 species of plants as occurring in the eighteen Northern United States and Canada East, embracing an area of no less than 600,000 square miles. The whole of California and Oregon includes only about 250.000 square miles, only a very small portion of which could have been thoroughly explored by Mr. Wood; how unlikely, then, that he should have actually obtained, in nine months, 368 species more on 250,000 square miles, than all the botanists of the East have found on more than double that area. Mr. Bolander also brought forward ample evidence to show that Mr. Wood was not competent to determine how many new species he had collected, proving by the written statements of Dr. Kellogg, and others, that he was not acquainted with some of the most common and easily recognized genera of this coast.

Dr. Gibbons made some remarks on the rain-fall of this region during the last seventeen years.

Mr. Gutzkow exhibited a sheet of metallic silver of three feet in diameter, and about three ounces Troy weight, which had the appearance and consistency of white writing paper. It was taken from the surface of a lead-lined tank, in which a solution of protoxide of iron was saturated, near the boiling point, with sulphate of silver. If the temperature of the solution is maintained at a certain height, sheet after sheet can be stripped off from the surface. The silver thus obtained, is, after washing with muriatic acid to free it from the iron solution, chemically pure, and by its peculiar shape and purity, well adapted to serve as proof silver for assaying purposes. The experiment will work only when operating on a rather large scale, so as to prevent the too sudden cooling of the solution. The chemical action to which it is due is the oxydation of the protoxide of iron into sesquioxide at the expense of the oxygen combined with the silver. This oxydation, which is known to precipitate the silver as a whitish powder, begins to take place only at a certain temperature below the boiling point, and is made, in the above experiment, to act on the crystals of sulphate of silver separating on the surface of the slowly cooling solution.

## Regular Meeting, March 18th, 1867.

President in the Chair.

Twenty-six members present.

Messrs. Elisha Brooks, Ellis H. Holmes, L. C. Lane, M.D., John C. Pelton, J. M. Sharkey, M.D., J. A. Bauer, and Robert Hagen, were elected Resident Members, and W. H. Dall a Corresponding Member.

Donations to the Cabinet: Crystal of Borax, from Borax Lake, by Mr. Lightner; a Bald Eagle, by Dr. Ayres; a specimen of Wallapi Food, by Frank S. Alling, El Dorado Cañon; gold-bearing Quartz, from South Carolina, by Gregory Yale; Wolf Fish, from Frank Johnson; specimen of *Bdellostoma*, from Dr. Canfield.

Dr. Cooper presented the following paper:

### The West Coast Helicoid Land Shells.

BY J. G. COOPER, M.D.

In the article on p. 259, Vol. III, of these Proceedings for April 2d, 1866, I suggested a division of the Californian Banded Helices into five subgenera, founded on the shells alone. Since then, Mr. G. W. Tryon has published a synopsis of all of them except *H. facta* in his "Journal of Conchology," Vol. II, Part 4, for October, 1866, arranging them in the "genera" *Aglaia, Arianta* and *Polymita*, but differing essentially from Albers and other authors in the species he assigns to these groups. The types of these subgenera, however, differ so much from our species that it is easy to separate the shells by good subgeneric characters; and as they inhabit respectively South America, Europe, and Cuba, it is very probable that the animals differ still more. Until these have been compared, we may well hesitate in referring ours to the same groups, and must for the present be guided by the shells alone.

In examining these, the most striking and almost universal character we find is the presence of a dark band, generally pale margined, on one or both sides, and situated at or close to the breathing aperture in the animal's mantle, apparently having some physiological connection with this opening. It is too uniform and general to be merely an ornamental marking, such as we find in many species, especially the tropical, which usually show no uniformity in the arrangement of their bands.

The next most constant characters are those derived from the nature of the surface, whether hirsute, with revolving grooves, smooth or variously sculptured, with wrinkles, zigzag or oblique patterns.

Although colors alone are usually unreliable as subgeneric characters, I am inclined to consider them as such in the case of these and some allied species, from their apparent connection with important organs. In fact the band, so constant in this large series of species, takes precedence of considerable variety of form, for the variations in outline, umbilicus, and peristome, though great in the extremes, are so gradually shaded and blended together in the whole series that no well-defined generic divisions can be founded on them, though useful for the minor grouping. The umbilicus especially is variable even in specimens of the same species, those from southern and arid regions being often nearly imperforate, and more conical than others.

Several Mexican species belong to the same series, such as H. REMONDII *Tryon*, H. GRISEOLA *Pfeiff*, and H. BERLANDIERIANA *Moric.*, the two last extending to Texas. Others, as H. HUMBOLDTIANA *Val.*, scarcely differ from the typical *Pomatia* in form. I would, however, exclude the true *Hygromias* associated with these by Tryon. I would also exclude the plain or variegated species of Lower California, which approach nearer to *Polymita*. It must be observed that many of our species approach in form to others of allied groups, so that if we overlook characters of color and surface, we will be inclined to place in the same groups, Nos. 40 and 52, 24 and 32, 29 and 47, etc. Even in color Nos. 32 to 35 show an approach to the group of Lower California, but seem more closely allied to our series, having merely a geographical affinity to the former. Size is of little value, even as a specific character among the land shells, nearly all the species furnishing specimens twice as large as others of the same kind. The proportions of height to breadth are more reliable, but not constant.

The subgenus or division characterized by the band is scarcely distinguishable as a whole from the typical *Helix*, (type *pomotia*) of Europe, though the extremes vary greatly, simulating the three or more foreign genera to which various authors have attached them.*

Our species are distinct enough among themselves when the true specific characters here given are noted, though occasionally hybrids undoubtedly occur. Dr. W. Newcomb has raised many specimens in his garden in Oakland, combining the characters of Nos. 24, 25, 29, 31, and 43, in such manner that it is often impossible to determine which they belong to. Yet their natural locations are usually so widely separated that only occasionally can hybrids occur in a state of nature, and where several do inhabit one locality, as 24, 27, 28, 46 do at Santa Cruz, though nearly allied, intermediate forms are not found. Some of the so-called species are, however, scarcely more than hybrids or varieties, but the names are retained as indicating their differences, though almost every species is divisible into varieties as well marked or better. Thus the specimen described on p. 260 of this volume (from Mount Diablo) seems to be a hybrid between *mormonum* and *ramentosa*, and we also find specimens connecting the latter with 25, 26, and perhaps others.

---

* Extreme specimens of *H. arrosa* found by Mr. Gabb in Mendocino County, Cal., its northern limit, and also one of *H. redimita* found in Alameda County by Mr. Holder, have exactly the form of *H. pomatia*, and in each case have one and a half whorls less than the types, indicating perhaps that the usual forms found here are higher developed than the type of the genus. (A genus *Pomatia* has also been founded on this type of the Linnæan genus *Helix*.)

*Aglaia* was used by Escholtz, 1825, in Acalephæ, by Swainson, 1827, in Birds, and by Renier in Philinidæ, before Albers adopted it in this order!!

Occasional links also occur, connecting many others of the banded species together.

A similar intermixing of species, where nearly allied, occurs among our marine shells wherever two or more encroach on each other's limits; but the comparative rarity of the intermediate forms seems to indicate hybridity rather than specific identity of their allies.

It is probable that groups X and XI and XIII and XIV should be united, as the distinctive characters between them are not of first importance, and species of each are very closely similar otherwise. Parallel columns may be formed, as indicated on p. 260, in which close resemblances in form, number of whorls, etc., between species of the different groups may be shown, and this may be extended so as to show analogous parallels with those of other sub-families, or even families, but these resemblances do not indicate affinity, though very likely to mislead. A geographical arrangement of some groups is also indicated, though imperfectly, as there are no impassable limits between them. For special localities of many species, see vol. III, pp. 62, 115, 180, 259, and II, 91, 103.*

The Darwinian theory of development might be very beautifully illustrated by these banded snails, if we could find evidence that their various forms had all originated from a common stock (which might be the *ramentosa*, as that species now occupies a nearly central locality). But though fossil forms have been found differing considerably from their present representatives, there are others apparently as old, which show no such differences, and none of them show a tendency towards any common original type. The one referred to by Professor Whitney on p. 278, as found with the human skull of supposed pliocene (?) age, does not differ perceptibly from specimens of *mormonum*, now living near the locality. It retains even its band of color, which is soon lost in specimens imbedded near the surface, and this (if not preserved by its deep burial or incrustation) is strong evidence against a great antiquity of the skull. All other fossil Helicoids are considered postpliocene, at least so far as known in this State, though *extinct* species occur in Europe as far back as the Eocene.

The bandless species of the west coast slope, from lat. 33° to 49°, are added to the synopsis, to show their relations and analogies with the banded. The arrangement followed is essentially that of Tryon, except the addition of some he has omitted, or not yet published. The generic divisions are also reduced to groups, as the true generic characters are not yet settled. The lip is entirely wanting in the first family, but in the bandless *Helicidæ* of this coast, it becomes of great importance for grouping of species, (49 to 55) of which we have very few, while east of the Rocky Mountains there are more than fifty. Group III is also largely developed on the Atlantic slopes. The tendency now is to divide too much, which is as unnatural as to unite all under genus Helix, as many still do. It is probable that the divisions here called subfamilies, answer more nearly to the true genera than any others, though they require modification, and the selection of names applicable to them as genera, is a difficult task. To undertake to distinguish genera by the lingual teeth, mucous pores, or any other single character of the soft parts, is less practicable than to do it by the shells alone, and little if any more reliable. There may, however, be foreign shells closely resembling ours in form, which must still be separated on account of the animal.

---

* See, also, the "Geographical Catalogue of West Coast Mollusca," published by the State Geological Survey, April, 1867.

I have omitted most of the compound terms used by authors to describe the forms of shells, as they are not used with any uniform system, and do not well define the differences between the various species of the same group. The dimensions are more reliable for separating allied forms. "Striæ" is also an indefinite term, used by various authors for lines of growth, revolving grooves or stripes of color, and is therefore never used alone in this article.

It is remarkable that no *reversed* species or variety has yet been found west of the Rocky Mountains.

## Order PULMONIFERA.

Mollusca with or without shells, breathing by lungs, inhabiting the land, fresh or salt waters.

### Subord. GEOPHILA.

Terrestrial Molluscs. Section with external rounded shells.

A. Shell with edge of mouth sharp.

Fam. *Helicellidæ.* Shell corneous, thin, polished, translucent, sometimes with *internal* teeth.

Subfam. *Vitrininæ.* Shell very fragile, whorls 2 or 3, the last greatly expanded, not covering the animal.

I Genus BINNEYA Cp. Ear-shaped, nearly flat, one-third the length of animal, spire none, corneous.

1 **notabilis** *Cp.* Whorls 2, pale brown, first with 30 delicate revolving ribs, epidermis expanded; diam. * 0.46, alt. 0.12 in.

II Genus VITRINA Drap. Depressed subglobose, last whorl very large, swollen, imperforate, shining.

2 **Pfeifferi** *Newc.* Wh. 3, greenish white, suture finely margined, columella arched, spire flattened, diam. * 0.19, axis 0.09.

Subfam. *Helicellinæ.* Shell thin, translucent, whorls 4 to 6, mouth moderate, surface smooth, pitted below or perforated.

III Group. HYALINA Feruss. Depressed globose, moderately umbilicate, or pitted, vitreous, shining, whorls uniform.

3 **Breweri** *Newc.* Wh. 5, pale corneous, umbilicus large, suture slightly channeled, aperture lunar; diam. *0.20, axis 0.10.

IV Group. MACROCYCLIS Beck. Discoid, widely umbilicate, growth lines often coarse, last whorl usually deflexed.

4 **Newberryana** *W. G. Binn.* Wh. 6, reddish-brown, flattened, mouth *not* deflexed, fine revolving striæ; diam. 1.43, axis 0.50.

---

NOTE.—The * indicates the original measurement of authors, in hundredths of an inch.

5 **Vancouverensis** *Lea.* Wh. 5, yellowish-green, shining, very slight revolving grooves; diam. 1.10 to * 1.25, axis 0.40.

6 **sportella** *Gould.* Wh. 5, pale-greenish, growth lines coarse, crossed by revolving grooves; diam. *0.50 to 0.70, axis 0.20 to 0.25.

7 **Voyana** *Newc.* Wh. 5, pale corneous, mouth much sinuated above, body whorl crossed by a thick callus; diam. *0.50, axis 0.15 to 0.20.

Subfam. *Gastrodontinæ.* Generally depressed conic, and lamellarly toothed inside, growth lines distinct, small.

V Group. CONULUS Fitz. minute, conoid, whorls 4 to 6, narrow, aperture basal, transverse, perforate or not, without teeth.

8 **chersina** *Say.* Wh. 5–6, amber-yellow, imperforate, base indurated, smooth, shining; diam. 0.10 to 0.12, axis, 0.08.

9 **chersinella** *Dall.* Wh. 4½ to 5, yellowish, narrowly perforate, mouth oblique, growth ribs distinct; diam. *0.14, axis 0.09.

Subfam. *Patulinæ.* Thickish, epidermis opaque, form discoidal to subglobose, umbilicate, often striped or hirsute.

VI Group. PSEUDOHYALINA Morse. Minute, convex discoid, nearly smooth, umbilicate, unicolor, whorls 3 to 5.

10 **milium** *Morse.* Wh. 3, greenish white, plano-convex, translucent, minute revolving grooves; diam. 0.05, axis 0.02. Nevada Co. and Angel Island, *Rowell*, Monterey, *Canfield*, San Francisco and Santa Cruz, rare. No revolving grooves seen.

11 **minuscula** *Binn.* Wh. 4, whitish, nearly flat, mouth sub-oval, whorls narrow, smooth, a parietal callus; diam. 0.09, axis 0.01.

12 **conspecta** *Bland.* Wh. 4, dark corneous, obtuse convex, smooth, mouth sub-circular, oblique; diam. 0.08 to 0.10, axis 0.04 to 0.05.

VII Group. PATULA *Held.* Size moderate, convex-discoid, concave below, umbilicus showing all the whorls, unicolor.

13 **Hornii** *Gabb.* Wh. 4½, opaque, brown, *sparsely hirsute*, spire flattened, umbilicus a little contracted; diam. *0.16, axis 0.09.

14 **Whitneyi** *Newc.* Wh. 4, smoky-brown, smooth, nearly flat, umbilicus plainly perspective; diam. *0.20, axis 0.10.

15 **Cronkhitei** *Newc.* Wh. 4, yellowish corneous, a little convex, growth-ribs distinct, not plainly perspective; diam. *0.20, axis 0.15.

16 **striatella** *Anth.* Wh. 3–4, pale corneous, depressed convex, umbilicus large, shallow, growth-ribs faint; diam. 0.20, axis 0.15. The west slope specimens may be all of last species.

17 **Durantii** *Newc.* Wh. 4, light corneous, flat above, nearly smooth, umbilicus perspective, opaque; diam. *0.20, axis 0.07.

VIII Group. HELICODISCUS? Morse. Planorboid, whorls visible below, several sets of internal teeth. ("POLYGYRA" Tryon, part.)

18 **polygyrella** *Bland.* Wh. 7 to 8, yellowish horn color, 3 teeth opposite mouth, 3 nearer mouth, 1 parietal; diam. *0.44, axis 0.19.

IX Group. Anguispira Morse. Large, rather heavy, subturbinate, strongly ribbed, grooved or striped, umbilicate.

**19 Idahoensis** *Newc.* Wh. 5, ashy corneous, very convex, 20 to 25 strong ribs on last whorl, fewer above; diam. *0.52, axis 0.45.

**20 Cooperii** *W. G. Binn.* Wh. 5 to 6, white, 1 or 2 brown distant bands or mottlings, fine revolving grooves; diam. 0.58 to 0.98, axis 0.35 to 0.37.

(*a*) **21 solitaria** *Say.* Wh. 6, white to dark brown, 1 to 4 brown bands, or a var. (?) brown, with 1 pale band; diam. 1.00, axis 0.80.

**22 strigosa** Gould. Wh. 5, ashy to brown, usually 5 to 8 banded below middle, angled or carinate, revolving grooves; diam. 0.75 to 1.00, axis 0.28 to 0.50.

*N.B.* Nos. 13, 16, 18, and Group IX are found only east of California.

B. Shell with a distinct thickened lip.

Fam. *Helicidæ.* Epidermis thickish, opaque, colored, lip thickened, expanded, reflected or toothed. Large or moderate.

Genus Helix *Linn.* Form globose—conic to depressed carinate; umbilicus wide to very small or covered; lip thickened, sometimes a little expanded, and rarely tuberculate below, or continuous across body whorl. Color, (in our species) yellowish brown to black, with a darker band around the periphery and sutural region, generally margined on each side (at least when young) by a pale one.

† Band triple in young and thin specimens, (wanting in varieties. Bandless specimens of Nos. 24, 25, 27, 28, 33, have been noticed.) Colors, uniform brown or olivaceous, sometimes mottled. Obliquely reticulate grooved, or wrinkled-malleated. From forests of oak, etc., in middle regions, or moderate elevations southward.

X Group. ("Arianta" Albers, No. 23. "Polymita" Tryon, No. 24.) Form resembling *H. pomatia*, sculpture in zigzag or divaricate grooves. Subimperforate.

**23 Californiensis** *Lea.* Wh. 5, yellowish-olive, thin, band pale-margined, sculpture faint, subglobose; diam. 0.75 to 0.88, axis 0.56 to 0.62.

**24 redimita** *W. G. Binn.* Wh. (4½) 5½ to 6, reddish brown, band single, umbil. small or none; (var. of 25 ?) diameter 0.80, axis 0.48.

XI Group. (Arianta and Aglaia part., auct.) Form much like *Arianta arbustorum*, sculpture like last. Umbilicate.

**25 Nickliniana** *Lea.* Wh. 6 to 7, yellowish-brown, oblique grooved, wrinkled or malleated, umbil. small; diam. 0.72 to 1.05, axis 0.42 to 0.80.

**26 Bridgesii** *Newc.* (Not of Tryon, 1866.) Wh. 6, grayish corneous, thinner, band broader, umbil. wider than 25 (a var.?); diam. *1.00, axis 0.73.

**27 arrosa** *Gld.* Wh. 5½ to 7, brown, mottled yellow, (vars. yellow or olive, bandless) wrinkled malleate; diam. 1.10 to *1.60, axis 0.59 to 0.90.

---

(*a*) The west slope specimens may be all of species 20.

**28 exarata** *Pfeiff.* (Not of Weigm. = cælatura *Fer.*) Wh. 6 to 7, yellow, or olive and brown mixed, strongly wrinkled, faintly malleate; diam. 0.75 to 1.15, axis 0.40 to 0.62.

**29 ramentosa** *Gld.* Wh. 5½ to 6½, yellowish brown, thin, oblique grooved, sometimes wrinkled; diam. 0.70 to 1.30, axis 0.57 to 0.90.

**30 reticulata** *Pfeiff.* "Wh. 5½. reddish brown, band single, sculpture like 29," (probably a var.); diam. *0.85, axis 0.47.

**31 tudiculata** *Binn.* Wh. 5 to 5½, brown or olive, band wide, paler margined, malleate, body whorl swollen; diam. 0.90 to 1.40, axis 0.45 to 0.80.

XII Group. ("Polymita" Tryon, part, "Arianta" Albers. part.) Sub-globose conic; axis, 0.6 to 0.8 diam.; band single, obscure, or none, often mottled; smooth or with revolving grooves, subimperforate. Usually paler below.

**32 Kellettii** *Forbes.* Wh. 5, reddish with pale mottling in bands, faint revolving or oblique grooves; diam. 0.72 to 1.20, axis 0.48 to 0.68.

**33 crebristriata** *Newc.* Wh. 5, dark corneous. band obscure or none, lip sometimes continuous; diam. *0.92, axis 0.55 to 0.80.

**34 intercisa** *W. G. Binn.* Wh. 5, grayish or brown, band obscure, deeply grooved, lip thick, continuous, tubercled; (= 33 var.?) diam. *0.84, axis 0.57. "*Hab.* probably San Miguel I." *Newcomb*, from worn specimens in his museum, not "Oregon."

**35 Tryoni** *Newc.* Wh. 5½ to 6, bluish or mottled, pale below, band faint, lower lip sometimes tubercled; diam. *0.80, axis 0.55.

**36 Carpenteri** *Newc.* Wh. 5½, brownish white, band faint, fine revolving grooves, mouth subcircular; diam. *0.90, axis 0.64.

**37 ? Rowellii** *Newc.* "Wh. 4½, opaque white, no band, or sculpture" (bleached?), mouth subcircular, umbilicate; diam. *0.60, axis 0.40. (Unique specimen, and may be of the Mexican group, like *lævis*, etc.)

"Arianta" Remondii *Tryon*, and "Galaxias" griseola and Berlandieriana, of Mexico, seem to connect this group with the next.

†† Band triple, colors strongly defined.

XIII Group. (Aglaia *Alb.* part.) Generally lower than group XII, and lip more expanded, umbilicus large or moderate, with revolving grooves, or smooth.

‡ Colors light, often palest below. Inhabit dry or treeless regions, from lat. 32° to 36°.

**38 facta** *Newc.* Wh. 5 to 5½, white, or brownish above, lip yellow, umbil. nearly covered; diam. *0.42, axis 0.22.

**39 Gabbii** *Newc.* Wh. 5, band margins and grooves obsolete; (unique, between 38 and 40;) diam. *0.40, axis 0.20.

**40 rufocincta** *Newc.* Wh. 5 to 6, pale brown, depressed, umbil. moderate, lip broad; diam. 0.50 to 0.85, axis 0.22 to 0.45.

**41 Traskii** *Newc.* Wh. 6 to 6½, like last, but umbil. larger, lip thinner, usually higher; diam. 0.90 to 1.00, axis 0.40 to 0.62.

**42 Ayresiana** *Newc.* Wh. 6 to 7, yellowish, paler below, strongly grooved, spire elevated; diam. *0.80, axis 0.55. "Santa Cruz I., Cal." Newcomb coll.

‡ ‡ Colors dark, often paler above. Inhabit damp coniferous forests, lat. 37° to 50°.

**43 Dupetithouarsii** *Desh.* Wh. 7 to 8, brown or olive, band margins whitish, grooves obsolete, often submalleate; diam. 0.90 to *1.20, axis 0.54 to *0.60.

**44 fidelis** *Gray.* Wh. 6½ to 7, band and beneath black, band margins and above red or yellow (a hybrid? var., black, and becoming slightly angled); diam. 1.12 to 1.50, axis 0.60 to 0.90. "Oregonensis" *Lea*, may be = 44 jun.

XIV Group. (Aglaia Albers, part.) Depressed, usually subangled, hirsute or bristle marked, umbil. large.

**45 infumata** *Gld.* Chestnut to black, a single band sometimes visible, angled, lip thin, bristles deciduous; (closely allied to black var. of 44;) diam. 1.40 to *1.50, axis 0.54 to 0.60.

**46 sequoicola** *Cp.* Wh. 6½, dark brown, rounded, bristles only in young, leaving marks; diam. *1.08 to 1.20, axis 0.50 to 0.54.

**47 Mormonum** *Pfeiff.* Wh. 6 to 6½, brown, depressed, sometimes subangled, sometimes bristle marked; diam. 0.95 to 1.30, axis 0.50 to 0.54.

**48 Hillebrandi** *Newc.* Wh. 6, yellowish brown, bands hid by persistent long bristles, subcarinate, lip broad; diam. 0.80 to 0.96, axis 0.35 to 0.40.

C. Bandless; lip more developed, reflected, often toothed at the base.

Genus Mesodon *Raf.* Lip broadly expanded, often 1–3 toothed, or with parietal tooth only, sometimes none; corneous.

XV Group. ("Arianta.") Toothless, umbilicus large, surface coarsely wrinkled or granulate, lip broad, reflexed.

**49 Townsendiana** *Lea.* Wh. 5½ to 6, mixed yellow and brown, body whorl coarsely wrinkled, fine revolving grooves; diam. 0.68 to 1.38, axis 0.35 to 0.55. (*a*)

**50 anachoreta** *W. G. Binn.* "Wh. 6, reddish ashen, granulated and sparsely indented;" diam. *1.00, axis 0.54.

XVI Group. Odotropis *Raf.* "Tooth upon columella, umbilicus covered." Lower lip tuberculate, and a parietal tooth.

**51 devia** *Gld.* Wh. 6, brown or olive, no sculpture except distinct lines of growth; diam. 0.80, axis 0.45.

---

(*a*) A specimen figured by Mr. Tryon in the last number of the "Journal" just received, (May, 1867), as "var. *minor*," from Idaho and Nebraska, seems to have an obscure band, which, together with its form and want of wrinkles, indicate entire distinctness from *Townsendiana*. The small form of the latter found by me in Montana has no band, and seems close to Binney's *anachoreta*, of which supposed specimens from "Oregon" are in Mr. Rowell's collection. The Eastern *Mesodon clausa, elevata* and perhaps others, have been found banded occasionally, but without the paler margins, and only as an exception.

XVII Group. APLODON *Raf.* One parietal tooth, (or none) perforate or imperforate, hirsute or smooth, lip simple.

**52 Columbiana** *Lea.* Wh. 5½ to 6, corneous brown, with or without hairs, umbilicate; diam. 0.50 to 0.70, axis 0.25 to 0.35. The small imperforate and toothed form usually classed with this species may better be considered a rounded var. of *germana*, the subangled form of which is very rare.

**53 germana** *Gld.* "Wh. 5½, reddish corneous, hirsute, subangled, one parietal tooth, imperforate;" diam. *0.30, axis 0.20.

XVIII Group. TRIODOPSIS *Raf.* "Umbil. large, a tooth on each lip, and one parietal." Sometimes hirsute, hairs deciduous.

**54 Mullani** *Bld.* Wh. 5½ to 6, brownish corneous, microscopic spiral lines and tubercles; (hairy?) diameter *0.53, axis 0.29.

**55 loricata** *Gld.* Wh. 5½, brown or greenish, scale-like wrinkles quincuncially arranged; diam. *0.25 to 0.35, axis *0.10 to 0.20.

I am indebted to Dr. Newcomb and Mr. R. E. C. Stearns for much assistance in preparing this paper. Though not offered as a final arrangement of the species, it is hoped that this synopsis may aid in their determination, and thus make a step towards a correct systematizing of this difficult series.

There are four or five other subgenera among the 50 species of this family in the Atlantic States, divided by Bland into fifteen groups. He places Nos. 51, 54, and 53 in his 8th, 9th, and 15th groups respectively.—(Ann. N. Y. Lyc. N. H. 1864.)

Prof. W. P. Blake read the following:

## Origin of the Submerged Forests in the Columbia River, Oregon.

BY WM. P. BLAKE.

The submerged forests of fir trees, extending about twenty-five miles along the Columbia River, above the Cascades, have long excited the curiosity of travelers upon that stream. The trees stand erect as they grew, but the tops have decayed and broken off, leaving only those portions of the trees that have been protected from the air by the covering of water. At extreme high-water very few of these old trunks can be seen, but at low-water they appear in great numbers, and project a few inches or feet above the surface, and in some places they extend far out into the stream.

These trees are not petrified, as is supposed by many. The outer portions are much softened and partly decayed, but towards the heart the wood is sound, and appears to be identical in character with the fir which covers the mountains around. Some cedar stumps are also found.

It is well known that fir trees will not grow below the high-water mark of our streams, or where the roots would be subject to overflows. Flooding the roots of the fir even for a few days is sufficient to destroy its life. It is thus clear that there has been a change in the level of the water since the forests grew. Either the land has sunk or the water has been raised : the latter appears to have been the fact.

The river at the Cascades, just below the submerged forests, plunges over great masses of a hard volcanic conglomerate, which forms the base of the cliffs on each side. This conglomerate, which is 150 to 200 feet thick, rests upon a stratum of sandy clay. This stratum is much softer than the conglomerate, and yields more rapidly to the action of running water. It may be seen when the water is low, at the foot of the Cascades, with the hard conglomerate overhanging it in large masses.

From all these facts, it appears that the river, in cutting its way downwards through the Cascade Range, reached this soft substratum, and for a long time flowed in a comparatively unobstructed channel at a much lower level than now, thus permitting the forests to grow along its banks. The extensive undermining of the conglomerate caused it at length to fall into the stream, and this, together with the sliding in of the banks upon this soft foundation, I regard as forming the obstruction which dammed the waters and caused the overflow of the forests above.

The mountains rise on each side to a height of 2,500 or 3,000 feet, and are composed of nearly horizontal beds of lava. One of these mountains on the right bank, or Washington Territory side, presents vertical cliffs towards the Cascades, and these cliffs have a *freshly broken* appearance, as if a large part of the mountain had *broken off* at no very remote period. The surface of the country between this cliff and the Cascades is very much broken, and the railroad which traverses it, exposes enormous masses of the conglomerate, piled confusedly together as if they had been hurled down by a land-slide. Mr. Brazee, the engineer of the Oregon Steam Navigation Company, informs me that the ground is in constant motion toward the river, and it has necessitated the relaying of the track within the past year. The same phenomena have been observed on the left bank, or Oregon side. The bank is in constant motion there, and at low-water a fine blue clay may be seen rising in the channel, as if crowded out by the pressure of the rocks above. As there has not been any perceptible change of level in the stream for years past, we may conclude that the erosive action of the current is fully equal to the encroachment of the banks.

The Indians of the Columbia have a tradition of a great convulsion at the Cascades. They assert that the Chinook canoes formerly ascended the river as far as a water-fall at the Dalles, passing, at the Cascades, *under a bridge of rock.* This bridge, or arch of rock, they say, fell in at the time of a quarrel between the two mountains, Mt. Hood and St. Helen's, and at the same time the waterfall at the Dalles was destroyed, so that salmon could ascend to the Upper Columbia. Before that the fall was so high that salmon could not get up, and all the upper country Indians were obliged to go to the Dalles for their supply.

The general accuracy of this tradition seems highly probable. The Dalles are now a succession of rapids and low falls, in a narrow channel, between vertical walls of basaltic lava. There is very little fall or current in the river below the Dalles to the Cascades, and the elevation of the water by an obstruction at the latter point would in all probability affect the height of the lower fall at the Dalles.

The sandy substratum of the coarse conglomerate at the Cascades is evidently an old river or beach deposit. It is accompanied by layers of round water-worn rocks, and is filled with trunks of trees lying prostrate. These trees are fossilized. Some of them are half coal and half stone. The central portions are usually coal-like or carbonized, and the outer parts silicified They vary in size, from a few inches to six feet in diameter, and are nearly all flattened by pressure. This stratum is evidently the source of the great quantities of silicified wood which are found about the Cascades.

Mr. Stearns read the following note on a large specimen of *Orthagoriscus analis*, Ayres:

In passing through the Italian Fish Market in this City, in the month of October, 1866, I noticed an unusually large specimen of *Orthagoriscus analis*, commonly called "Sun Fish," described by Dr. Ayres on page 31 of Vol. II of the Academy Proceedings. Curiosity led me to make a measurement, which I find in my note-book as follows: length from snout to extreme caudal point, 5 feet 8¼ inches; from tip of dorsal to tip of anal fin, 7 feet 6 inches. I found the anal and dorsal fins to be nearly the same length, measuring from the tip to junction with body 23 inches. Weight, as stated by the fishermen, 632 pounds. It will be seen that the measurement from tip to tip of fins as above, exceeds the length by 21¾ inches.

Mr. Stearns made the following remarks as to the true habitat of *Helix Ayresiana*, Newc.:

On page 103, Vol. II, of the Academy's Proceedings, may be found, under date of March 18th, 1861, the description by Dr. W. Newcomb of a *Helix H. Ayresiana*, the habitat of which was, as I learn from Dr. N., doubtfully assigned at that time to "Northern Oregon." Recently Dr. Newcomb has himself detected it on Santa Cruz Island, off the Coast of California, near Santa Barbara.

Professor Whitney exhibited a sample of the coal used at Salt Lake City, taken by Mr. Ives, chief of one of the Central Pacific Railroad surveying parties, from a wagon on its way from the mines to the city. The locality from which it was obtained is in Webber Cañon, and the geological age of the deposit is supposed to be cretaceous. The quality of the coal seems to be good; but nothing very definite could be communicated in regard to the extent or geological position of the bed.

Professor Whitney also exhibited a specimen of very pure rock salt, obtained from the Salt Mountain on the Muddy River, a branch of the Virgin, nearly a hundred miles south of Pahranagat, by Major S. S. Lyon, formerly of the Kentucky Geological Survey. Major Lyon being present, at the request of the President, gave an account of this interesting locality, which is one long known to explorers. He stated that the Salt Mountain lies on both sides of the Muddy River, and rises 400 feet above that stream. The locality is about thirty miles northeast of Colville, and twenty from the Colorado. Major Lyon also gave some facts in regard to the geology of the vicinity of Pahranagat, where he had been residing for some months past.

Professor Whitney presented two analyses of ores from the Comstock Lode, Virginia City, Nevada, made by Professor Domeyko, of Santiago, Chile, and communicated by Mr. Rémond, who is now residing in that place. They are as follows:

| | I. | II. |
|---|---|---|
| Gold, | 1.10 | 0.18 |
| Silver, | 15.90 | 8.90 |
| Lead, | 27.30 | 10.00 |
| Zinc, | 23.40 | 21.70 |
| Iron, | 2.80 | 12.00 |
| Copper, | 2.00 | ..... |
| Antimony, | 1.30 | ..... |
| Sulphur, | 18.70 | 26.90 |
| Matrix, | 7.50 | 20.32 |
| | 100.00 | 100.00 |

The name of the mine from which they were taken was not given.

Mr. Yale brought up the subject of the gold mines in Africa, supposed to be worked by the Emperor Napoleon III, and kept secret from the world in general. A discussion ensued, in the course of which Professor Whitney and Mr. Ashburner expressed their doubts as to the possibility of the locality of any extensive mining operations being long concealed, and their disbelief in the truth of newspaper statements to this effect.

## Regular Meeting, April 1st, 1867.

Prof. W. P. Blake in the Chair.

Thirty-two members present.

Messrs. Samuel I. C. Swezey, J. D. Farwell, Frederick Madge, D. J. Littlefield, Archibald Cooper, Samuel Pillsbury, Arthur W. Saxe, M.D., and Bernhard Marks, were elected Resident Members.

Donations to the Cabinet: A case of Butterflies, from the East India Islands and Brazil, collected and presented by Mr. Lorquin; California Snow Plant, (*Sarcodes sanguinea*) by Dr. Kellogg.

Mr. Stearns presented the following papers:

## Shells collected at Santa Barbara by W. Newcomb, M.D., in January, 1867.

BY ROBERT E. C. STEARNS.

1. Pholadidea penita, Conr.
2. —— ovoidea, Gould.
3. Saxicava pholadis, Linn.
4. Platyodon cancellatum, Conr.
5. Cryptomya Californica, Conr.
6. Schizothærus Nuttalli, Conr.
7. Neæra pectinata, Carp.
8. Clidiophora punctata, Conr.
9. Thracia curta, Conr.
10. Lyonsia Californica, Conr.
11. Mytilimeria Nuttalli, Conr.
12. Solen sicarius, Gould.
13. Solecurtus Californianus, Conr.
14. Machæra patula, Dixon.
15. Sanguinolaria Nuttalli, Conr.
16. Macoma secta, Conr.
17. —— yoldiformis, Carp.
18. —— nasuta, Conr.
19. —— inconspicua, Br. & Sby.
20. Mera modesta, Carp.
21. Tellina Bodegensis, Hds.
22. Cooperella scintillæformis, Carp.
23. Semele decisa, Conr.
24. —— rupium, Sby.
25. Cumingia Californica, Conr.
26. Donax Californicus, Conr.
27. Standella planulata, Conr.
28. Amiantis callosa, Conr.
29. Pachydesma crassatelloides, Conr.
30. Psephis tantilla, Gould.
31. Chione succincta, Val.
32. Tapes staminea, Conr.
33. Saxidomus aratus, Gould.
34. Rupellaria lamellifera, Conr.
35. Petricola carditoides, Conr.
36. Chama exogyra, Conr.
37. Cardium quadragenarium, Conr.
38. Lazaria subquadrata, Carp.
39. Lucina Californica, Conr.
40. Diplodonta orbella, Gould.
41. Kellia Laperousii, Desh.
42. Mytilus Californianus, Conr.
43. Modiola capax, Conr.
44. —— recta, Conr.
45. Adula falcata, Gould.
46. —— stylina, Carp.
47. Pecten latiauritus, Conr.
48. Janira dentata, Sby.
49. Hinnites giganteus, Gray.
50. Ostrea lurida var. rufoides, Gould.

51. —— —— var. expansa, Carp.
52. Bulla nebulosa, Gould.
53. Haminea virescens, Sby.
54. Tornatina cerealis, Gould.
55. Dentalium hexagonum, Sby.
56. Mopalia muscosa, Gould.
57. —— ——?
58. Acanthopleura scabra, Rve.
59. Ischnochiton Magdalensis, Hds.
60. Nacella insessa, Hds.
61. —— depicta, Hds.
62. —— paleacea, Gould.
63. —— vernalis, Dall (mss.)
64. Acmæa patina, Esch.
65. —— persona. Esch.
66. —— scabra, Nutt, Rve.
67. —— spectrum, Nutt, Rve.
68. Lottia gigantea, Gray.
69. Scurria mitra, Esch.
70. Rowellia radiata, Cooper.
71. Clypidella bimaculata, Dall (mss.)
72. Fissurella volcano, Rve.
73. Glyphis aspera, Esch.
74. Lucapina crenulata. Sby.
75. Haliotis Cracherodii, Leach.
76. Phasianella compta, Gould.
77. —— pulloides, Carp.
78. Pomaulax undosus, Wood.
79. Trochiscus Norrisii, Sby.
80. Chlorostoma funebrale, A. Ad.
81. —— aureotinctum, Fbs.
82. Calliostoma canaliculatum, Mart.
83. —— costatum, Mart.
84. Crepidula lingulata, Gould.
85. —— excavata, Brod.
86. —— navicelloides, Nutt.
87. —— —— var. nummaria, Gould.
88. —— —— var. explanata, Gould.
89. Hipponyx cranioides, Carp.
90. —— tumens, Carp.
91. —— serratus, Carp.
92. Serpulorbis squamigerus, Carp.
93. Turritella Cooperi, Carp.
94. Cerithidea sacrata, Gould.
95. Bittium filosum, Gould.
96. Litorina planaxis, Nutt.
97. —— scutulata, Gould.
98. Lacuna variegata, Carp.
99. —— unifasciata, Carp.
100. —— solidula, Loven.
101. Rissoa acutelirata, Carp.
102. Luponia spadicea, Gray.
103. Trivia Californica, Gray.
104. —— Solandri, Gray.
105. Erato vitellina, Hds.
106. Surcula Carpenteriana, Gabb.
107. Drillia inermis, Hds.
108. —— torosa, Carp.
109. —— mœsta, Carp.
110. Conus Californicus, Hds.
111. Odostomia sp.
112. Chemnitzia torquata, Gould.
113. Scalaria Indianorum, Carp.
114. —— subcoronata, Carp.
115. Cerithiopsis assimilata, C. B. Ad.
116. Lunatia Lewisii, Gould.
117. Ranella Californica, Hds.
118. Mitra maura, Swains.
119. Volvarina varia, Sby.
120. Olivella biplicata, Sby.
121. Nassa fossata, Gould.
122. —— perpinguis, Hds.
123. —— mendica, Gould.
124. —— Cooperi, Fbs.
125. —— tegula, Rve.
126. Amycla carinata, Hds.
127. —— tuberosa, Carp.
128. Amphissa corrugata, Rve.
129. Purpura crispata, Esch.
130. —— triserialis, Blve.
131. —— saxicola, Val.
132. Monoceros engonatum, Conr.
133. Ocinebra interfossa, Carp.
134. Cerastoma Nuttalli, Conr.
135. Muricidea Barbarensis, Gabb.

Dr. Newcomb also visited Santa Cruz Island, and collected the following species:

1. Waldheimia Grayi, Davidson.
2. Saxicava pholadis, Linn.
3. Semele decisa, Conr.
4. Acmæa scabra, Nutt.
5. Lottia gigantea, Gray.
6. Rowellia radiata, Cooper.
7. Haliotis Cracherodii, Leach.
8. —— corrugata, Gray.
9. Pomaulax undosus, Wood.
10. Trochiscus Norrisii, Sby.
11. Chlorostoma gallina, Fbs.
12. —— funebrale, A. Ad.
13. Chlorostoma aureotinctum, Fbs.
14. Trivia Californica, Gray.
15. Conus Californicus, Hds.
16. Amycla tuberosa, Carp.
17. Monoceros engonatum, Conr.
18. Cerastoma Nuttalli, Conr.
19. Muricidea incisus, Brod.
20. Trophon triangulatus, Carp.
21. Fusus ambustus, Gould.
22. Argonauta Argo, Linn.
23. Helix Ayresiana, Newc.

## List of Shells collected at Purissima and Lobitas, California, October, 1866.

BY ROBERT E. C. STEARNS, CURATOR OF CONCHOLOGY, CAL. ACAD. NAT. SCIENCES.

"Purissima" and "Lobitas" are the names of two creeks situated a few miles south of Spanish Town, in San Mateo County. Near the points where these streams empty into the ocean are small beaches and groups of flat rocks left bare at low tide, limited, however, in extent, as the shore in the neighborhood is for the most part exceedingly bold and precipitous, the ocean at ordinary high water beating against the base of the cliffs.

Dr. Newcomb and myself visited the localities at the period above mentioned, and collected the following species from among the drift or upon the rocks:

1. Waldheimia Grayi, Davidson.
2. Navea Newcombii, Tryon.
3. Zirphæa crispata, Linn.
4. Pholadidea penita, Conr.
5. —— ovoidea, Gould.
6. Netastomella Darwinii, Sby.
7. Parapholas Californica, Conr.
8. Saxicava pholadis, Linn.
9. Platyodon cancellatum, Conr.
10. Schizothærus Nuttalli, Conr.
11. Lyonsia Californica, Conr.
12. Mytilimeria Nuttalli, Conr.
13. Macoma inconspicua, Br. & Sby.
14. Standella falcata, Gld.
15. Tapes staminea, Conr.
16. —— ruderata, Desh.
17. Tapes diversa, Sby.
18. Rupellaria lamellifera, Conr.
19. Petricola carditoides, Conr.
20. Lazaria subquadrata, Cpr.
21. Kellia Laperousii, Desh.
22. Mytilus Californianus, Conr.
23. —— edulis, Linn.
24. Modiola fornicata, Gld.
25. Adula falcata, Gld.
26. —— stylina, Cpr.
27. Hinnites giganteus, Gray.
28. Placunanomia macroschisma, Desh.
29. Doris albopunctata, Cooper.
30. Cryptochiton Stelleri, Midd.
31. Katherina tunicata, Wood.
32. Tonicia lineata, Wood.

33. Mopalia muscosa, Gld.
34. —— Hindsii, Gray.
35. —— lignosa, Gld.
36. Acanthopleura scabra, Rve.
37. Nacella vernalis, Dall (mss.)
38. —— instabilis, Gld.
39. Acmæa patina, Esch.
40. —— pelta, Esch.
41. —— Asmi, Midd.
42. —— persona, Esch.
43. —— spectrum, Nutt.
44. Lottia gigantea, Gray.
45. Scurria mitra, Esch.
46. Glyphis aspera, Esch.
47. Clypidella callomarginata, Cpr.
48. —— bimaculata, Dall (mss.)
49. Haliotis Cracherodii, Leach.
50. ——rufescens, Swains.
51. Chlorostoma funebrale, A. Ad.
52. —— brunneum, Phil.
53. —— Pfeifferi, Phil.
54. Calliostoma canaliculatum, Mart.
55. —— costatum, Mart.
56. Margarita pupilla, Gould.
57. Crepidula adunca, Sby.
58. —— navicelloides, Nutt.
59. —— var. nummaria, Gld.
60. —— var. explanata, Gld.
61. Hipponyx cranioides, Cpr.
62. Litorina planaxis, Nutt.
63. —— scutulata, Gld.
64. Lacuna porrecta, Cpr.
65. —— unifasciata, Cpr.
66. Isapis obtusa, Cpr.
67. Erato vitellina, Hinds.
68. Drillia torosa, Cpr.
69. Scalaria Indianorum, Cpr.
70. —— subcoronata, Cpr.
71. Opalia borealis, Gld.
72. Velutina prolongata, Cpr.
73. Olivella biplicata, Sby.
74. —— intorta, Cpr.
75. Nassa fossata, Gld.
76. —— perpinguis, Hds.?
77. —— mendica, Gld.
78. Amycla gausapata, Gld.
79. Amphissa corrugata, Rve.
80. Purpura crispata, Chem.
81. —— var. septentrionalis, Rve.
82. Purpura saxicola, var. ostrina, Gld.
83. Monoceros engonatum, Conr.
84. Ocinebra lurida, Midd.
85. —— var aspera, Baird.
86. —— var. munda, Cpr.
87. —— interfossa, Cpr.
88. Cerostoma foliatum.
89. Octopus —— (n. s.?)

*Navea Newcombii,* alive in *Haliotis Cracherodii.* Nos. 4, 5, 6, 25, and 26 alive in soft shale between tide marks. *Doris albopunctata,* two specimens alive on rocks near low water mark. Of the Chitons, Nos. 31 and 36, particularly abundant; of the others named several specimens obtained, also one or two species undetermined. 41, common, alive, on *Chlorostoma funebrale.* 45 and 46, several living specimens between tide marks. 47 and 48, I think, are distinct species; suggest *Lucapina,* but foramen nearly twice as large as in shells of the latter of same size, differing also in sculpture and weight of shell. 49, animal lives for a long time, and affixes itself tenaciously to the rocks after the shell is removed. 63 and 65, together living on rocks near high-water mark, and on eel grass in pools left by the tide. 89, perhaps young of Mr. Gabb's species *O. punctatus;* two living specimens, as yet undetermined, probably a new species.

Professor Silliman read a paper "On Naphtha and Illuminating

Oil from Heavy California Tar (Maltha), and on the probable Origin of Petroleum." *

Prof. W. P. Blake read the following communications:

## Note upon the Brown-Coal Formation of Washington Territory and Oregon.

BY WM. P. BLAKE.

Openings recently made in the coal formations along the Cowlitz River have shown the existence of several seams of brown coal, ranging from two to seven feet in thickness. They are separated by layers of sandstone, and are underlaid by a pebbly conglomerate.

The seven-foot seam contains a few partings of clay about six inches thick, but is chiefly a very compact coal, which breaks out in large blocks with a conchoidal fracture. It is very tough, and is not easily broken. It has the appearance of cannel or splint coal. Exposure to the sun and air causes it to shrink and crack.

It burns freely, giving a luminous flame, and a light smoke, similar to that from wood. The ignited coals hold fire in a remarkable manner, and with a strong draught or blast give an intense heat. A single fragment, when ignited, will continue to burn slowly to the center under an envelope of ash. A sun-dried sample gave me 50.8 per cent. of volatile matter, chiefly gas. The residue was a brilliant coke, the fragments of which were slightly adherent, thus showing a tendency to cake. Trials of the coal in quantity in open grates failed, however, to show any caking qualities. Some portions of the coal expand when burning and give a porous coke, which in many respects resembles ordinary charcoal.

This deposit appears to be formed in great part of trunks of exogenous trees. One trunk has been cut through that was over four feet in thickness: a part of this was compact coal, and another portion was in a half silicified state. Lines of annual growth may be seen in some of the samples. This combustible partakes of the characters of both coal and wood, and is in fact a highly condensed wood, carbonized, without the loss of its volatile portions.

Fossil plants are found in abundance in the adjoining sandy beds. They are chiefly leaves of deciduous trees, but there are some very distinct impressions of palms. This is significant of a warmer climate.

The same formation of brown coal appears to extend along the Columbia, back of St. Helen's, where it is in close proximity to beds of iron ore, and the coal may perhaps be used to great advantage in the production of that metal.

---

* This paper is omitted by the Publication Committee, as it had already been published in the *American Journal of Science* at the time it was read before the California Academy.

## Analysis of Mt. Diablo (California) Coal.

BY W. P. BLAKE.

A sample of Mt. Diablo coal, from the Pittsburg mine, was analyzed by me in January last, with the following results :

| | |
|---|---|
| Water | 3.28 |
| Bituminous substances | 47.05 |
| Fixed carbon | 44.90 |
| Ash | 4.71 |

The sample was very pure, and apparently free from sulphur. Color black. Fracture sub-conchoidal, giving brilliant shining surfaces. It is very brittle, and is easily reduced to powder in a mortar. Streak, dark brown.

This coal does not fuse so as to cake and make a compact mass of coke. It is not therefore an economical coal for gas production. It gives a long flame in burning ; parts with its gas rapidly and breaks up into small fragments, thus necessitating the use of grate-bars with narrow openings. The above analysis differs from those hitherto published, chiefly in the amount of water and gas. Former analyses give from thirteen to fourteen per cent. of water.

Mr. Hanks presented an analysis of the rock-salt collected by Major Lyon on the Muddy River, as mentioned in the proceedings of the last meeting.

On Saturday, April 6th, the Academy made a field excursion to Angel Island, about fifteen members participating in the meeting. Facilities were afforded for the excursion by Major James T. Hoyt and General John A. King ; and to these gentlemen the thanks of the Academy were ordered to be returned by the Secretary.

## REGULAR MEETING, APRIL 15th, 1867.

Vice President Ransom in the Chair.

Thirty-three members present.

The collections made during the field meeting on Angel Island were exhibited and commented on.

Professor Silliman read the following paper:

## Notice of a peculiar mode of the occurrence of Gold and Silver in the Foot-Hills of the Sierra Nevada, and especially at Whisky Hill, in Placer County, and Quail Hill, in Calaveras County, California.

BY B. SILLIMAN.

In the search for ores of copper which occurred in California in what is now known as the "Copper Belt" of the Lower Sierras, deposits of "Iron Rust," as they were called by the miners, were observed at numerous points far below the range of the main gold belt of the Sierras. Several of these ochraceous deposits had been previously "located" by prospecting miners for gold, before there was any knowledge, or suspicion even, of the existence of ores of copper in connection with them. It was a matter of common observation that certain gulches, or watercourses in the neighborhood of these rusty deposits, were rich in placer gold, having been worked for gold from an early date. The search for copper in this kind of deposit was not commercially successful, although there were shipments of green and blue carbonates of copper, red oxide and metallic copper, to a limited extent from both the localities here referred to, the metal from which was known to contain a notable value of gold and silver, stated to be about fifty dollars to the ton of ore. This search for copper has, however, opened up these deposits so as to display their character in a conspicuous manner.

The rocks appear to have been originally talcose and chloritic schists, sometimes micaceous, inclosing masses of argillite, and of quartz which appears to have been massive enough at certain points to assume the character of a vein, and parallel to the stratification which has the usual north-western strike and easterly dip of the region. All this mass of material which at Quail Hill is certainly three hundred feet wide, and possibly twice that, and with a linear extent exceeding one thousand feet, appears to have been very highly impregnated or mineralized by sulphurets, chiefly of iron, with a portion of copper, zinc and lead. The sulphurets have undergone almost total decomposition throughout the entire mass, leaving soft ochraceous deposits of a rusty red and yellow color, and staining the rocks with brilliant colors, a peculiarity which the miners have characterized by the name of "Calico rocks." This decomposition or oxidation of the sulphurets, has extended to a point as low as atmospheric influences extend, or probably to a point where water is permanently found, which at Quail Hill is assumed to be about 170 feet below the outcrop of the mass, or crest of the hill. Dykes of porphyry and of other rocks, commonly called intrusive, are seen dividing these great ore channels in a direction conformable to the line of strike. But the decomposition which has affected other portions of the ore channel, appears also to have changed them, for they are found to be reduced completely to the condition of kaolin and lithomarge, or kindred alterations of feldspathic rocks. The outlines of the feldspar crystals are still easily distinguished, although the mass of the dykes is completely friable.

The zinc blende which is found in small quantities at Whisky Hill, and the vitreous copper also to some extent, appear to have escaped decomposition. The copper ores appear to have been confined to a portion of the deposit, as is indicated in the section exhibited, while the auriferous sulphuret of iron has been co-extensive with the ore channel, the cubical cavities left by the decay of its crystals being found in all the outcrops both in the quartz and in the 'calico rocks,' resulting from the decomposition of feldspathic and talcose or chloritic constituents.

Accompanying the entire mass of decomposition at both localities, occur both gold and silver, disseminated with remarkable uniformity in all parts of the orey ground. At Whisky Hill, films of metallic silver are visible upon the talcose masses stained green by malachite or chrysocolla; the gold is rarely seen in situ, being mostly obscured by the very rusty and highly-stained character of the associated materials. But it is rare that on washing a small quantity of any of the contents of these great deposits, gold is not found in angular grains or small ragged masses, from the size of a few grains' weight, to impalpable dust. Nuggets of several pennyweights occur occasionally. This gold has evidently accompanied the sulphurets and been left in its present position and condition by their decomposition. There can be little doubt that the gold of the gulches adjoining these deposits has been derived from them. At Whisky Hill, the gulch gold ceases to be found as soon as the limits of this deposit are passed, and the same is true at Quail Hill. The occurrence of deposits of this nature throughout the range of the foot-hills, seems to offer the best solution which has suggested itself of the origin of the placer gold which is found in situations so far removed from the gold belt of the upper Sierras, and away from sources usually recognized as those to which placer gold may be referred.

Experiments made by myself and by others on a considerable scale, the details of which will appear elsewhere, show that the amount of the precious metals disseminated in the average mass of vein stuff and decomposed materials of every name at Quail Hill, is considerably in excess of the general average tenor of gold veins in California. The mean of my own trials gave to the ton of 2,000 lbs. by assay:

| | |
|---|---|
| Gold | $35.14 |
| Silver | 15.08 |
| | $50.22 |

While from the working of carefully prepared averages in considerable quantity by milling process, the tenor of the precious metals was:

| | |
|---|---|
| Gold | $29.18 |
| Silver | 5.91 |
| | $35.09 |

The extremely friable condition of the entire mass of these auriferous materials renders their extraction and treatment easy and comparatively inexpensive.

At Whisky Hill, a mill of forty stamps has been set up which is now running with satisfactory returns. The cost by contract of delivery of the ores to the mill, being stated at forty cents (40c.) per ton, the cost of mining and treatment in mill being considerably less, it is said, than one dollar per ton, the amount treated being five tons to each stamp.

The chemical results of the extensive decomposition of metallic sulphids which has in former times occurred at these localities, offer an interesting problem in chemical geology. The sulphur has been removed chiefly as sulphuric acid beyond doubt, which has combined with iron and copper to form sulphates of these metals. These have for the most part disappeared, being washed out by the atmospheric waters, and have followed the drainage of the country. At Whisky Hill I found the sulphate of iron, (Coquimbite) sulphate of copper, (Cyanosite) and alum. The water of the shaft contains copper enough to redden the iron tools. At Quail Hill considerable masses of heavy spar are found, formed probably from the action of soluble sulphates upon witherite. No gypsum was observed at either locality.

The mineral species observed at Whisky Hill, are as follows:

Metallic Gold.
Metallic Copper.
Metallic Silver.
Red Copper.
Malachite (Green Carbonate of Copper).
Azurite (Blue Carbonate of Copper).
Chrysocolla (Silicate of Copper).
Cyanosite (Blue Vitriol).
Copper Glance (Vitreous Copper).
Zinc blende.
Galena.
Iron pyrites.
Alum.
Coquimbite.
Heavy Spar.
Hematite (chiefly the earthy varieties).
Kaolin.
Lithomarge and various aluminous and magnesian silicates resulting from the decomposition of the chloritic and talcose rocks.

The list of species is about the same for the deposit at Quail Hill.

The line of division between the ore-bearing ground in these great ore channels, and the country rock is quite distinctly seen on both the eastern and western outcrop at Quail Hill, and on the western at Whisky Hill. At the former place it is a dark bluish porphyritic rock, probably metamorphic, of a sandstone or silicious sediment. The outcroppings resemble those of many quartz veins, and I find the moss-covered portions of this quartzose matter full of cavities, resulting from the decay of pyrites, and yielding, by assay, three to five dollars to the ton in bullion.

From all the evidence presented, we seem justified in regarding these remarkable metallic deposits as segregated veins, holding a pretty uniform and high tenor of gold and silver, associated with and derived from the decomposition of extended masses of metallic sulphurets and quartzose matter, and carrying at times, ores of copper, the commercial value of which is, however, entirely subordinate to that of the precious metals which are found to characterize these veins or ore channels.

San Francisco, April 15th, 1867.

Mr. Falkenau read a communication "On the Spirit of the Age and its Influence in the Department of the Natural Sciences."

Mr. Bolander exhibited specimens of the *Apocynum* found in Round Valley, on moist land subject to overflow. The Indians make extensive use of it for fish-lines and other purposes. The specimens presented were collected by Mr. J. S. Silver, of Humboldt Valley, Nevada.

A field excursion of the Academy was made, on Saturday, April 20th, to the hills near the Twelve-Mile House, on the San José Railroad. By the courtesy of Richard P. Hammond, Esq., General Superintendent of the road, free passes to go and return were furnished to the members participating in this excursion.

### REGULAR MEETING, MAY 6th, 1867.

President in the Chair.

Thirty-two members present.

Messrs. F. F. Thomas, Silas A. White, B. Smith, M. J. McDonald, Wm. Patten and Philip Prior, were elected Resident Members, and Dr. C. L. Anderson, of Santa Cruz, Cal., Henry Walter Bates, Assistant Secretary Royal Geographical Society of London, Prof. J. H. Balfour, of Edinburgh University, Dr. John Alexander Smith, F.R.S., of Edinburgh, James Haswell, M.A., of the Geological Society of Edinburgh, Capt. J. B. Caldbeck, F.R.G.S., of Singapore, and Sir Roderick I. Murchison, President of the Royal Geographical Society of London, were elected Corresponding Members.

Donations to the Library: Gold and Silver Tables, by L. Garnett; Catalogue of Casts of Fossils for sale by Prof. H. A. Ward, of Rochester University.

The Committee on Field Meetings reported on that of April 20th, near the Twelve-Mile House. Specimens of the fossils collected at the locality visited were exhibited by Mr. Yale, and remarks were made on the position and age of the strata there exposed, by Prof. Whitney, Dr. Cooper and Mr. Stearns. Mr. Lorquin mentioned the species of birds seen and collected during the excursion.

Mr. Stearns presented, in behalf of Mr. Rowell, the following description of a new species of *Pisidium*, collected during the field excursion to Angel Island:

## Description of a New Species of Pisidium.

BY J. ROWELL.

*Pisidium angelicum*, Rowell.

Shell rounded oval, nearly equilateral, very convex; margin well rounded; beaks very slightly raised and very approximate; surface subgranulate, marked with from one to six very decided striæ or lines of growth; teeth too minute for observation.

Long. (of largest) 2 mill., Lat. 1.5 mill.; Diam. 1 mill.

*Habitat:* Angel Island.

Of California species, it is most like *P. abditum*, but differs in its sculpture, its less prominent beaks and its more globular and equilateral form. Most specimens are covered by an exceedingly persistent coat of jet black mud, making examination of them very difficult; but some are perfectly clean.

Mr. Stearns read the following note upon a recent

## Exhibition of Parhelia.

On Wednesday, the 17th day of (April) last month, at about 5 o'clock in the afternoon, my attention was attracted towards the heavens by an exhibition of the rather unusual phenomena (unusual in this latitude) known as *Parhelia*.

The sky in the west at the time was somewhat cloudy, and the atmosphere hazy. I was unable to determine the exact position of the sun, but its altitude was approximately 22° above the horizon; the diameter of the circle or halo was about 24°. A horizontal line, drawn through the sun and projected sufficiently in a northerly and southerly direction to intersect the halo, displayed at each point of intersection, a *parhelion* or mock sun of very considerable brilliancy, and continued for upwards of half an hour.

A much more extensive display of these phenomena was witnessed by me in the month of April, 1858, while residing near Boston, Massachusetts.

The sun was not far from the zenith, surrounded by a single broad halo, which latter was in turn inclosed by an outer circle of many halos all intersecting with each other and with the central halo—each of the numerous points of intersection gemmed with a *parhelion*. So extensive was the display, owing to the number of halos and the attendant *parhelia*, that the whole heavens from the zenith to within apparently 30° of the horizon, seemed covered with brilliant circles or rings, and resplendent with numberless suns. The sky, at the time, was obscured by a haze of considerable density, and a chilling wind was blowing from the south.

Some remarks followed upon sun and moon halos, during which Dr. Gibbons combated the popular notion that halos about the moon were infallible signs of rain. His observations proved that, in some seasons, these signs invariably failed in California, and at the East; he thought no rule could be established on the subject.

Mr. Goodyear presented the following paper in behalf of Professor Silliman:

## Notice of New Localities of Diamonds in California.

BY B. SILLIMAN.

Every well-authenticated instance of the existence of the diamond in the United States is of interest, since it serves to enlarge our knowledge of the geographical and geological distribution of this much esteemed gem.

I have the pleasure of exhibiting to the Academy four diamonds, obtained from separate localities in this State. Three of them are crystals, having the form of an icositetrahedron; the other has been cut, and is set as a ring stone.

*The First Specimen*—Is from Forest Hill, in El Dorado County. Its weight is 0.369 gramme, or 5.673 grains—equal to rather less than 1½ carats. Its color is good, but it has a small cavity and discoloration on one of the solid angles, and it is less symmetrical than the second specimen. This crystal was found at a great depth from the surface in a tunnel run into the auriferous gravel at Forest Hill. I procured this stone from Mr. Tucker, the well-known jeweler.

*The Second Specimen*—Is from French Corral, in Nevada County. It weighs 0.3375 grammes, or 5.114 grains—equal to about 1⅓ carats. Its form is symmetrical, color slightly yellowish. Its lustre has been dimmed slightly by having been subjected to a red heat as a test of its authenticity. The *auto da fé* is hardly the test a chemist would select for pure carbon! It is remarkably destitute of flaws. This crystal was washed out from the cement in the deep gravel washings for gold at French Corral, and was found in the sluice boxes. It belongs to Mr. Egbert Judson, of San Francisco, from whom I derive this information.

*The Third Specimen*—Is smaller and less perfect than either of the preceding. It was found at Fiddletown, in Amador County. It weighs 0.2345 gramme, or 3.619 grains—a little less than one carat. This crystal is distorted, and has several reëntering angles and cavities. Mr. M. W. Belshaw, to whom it belongs, informs me that since 1855, five diamonds have, to his knowledge, been found at Fiddletown, where he then resided; none of them weighing much over one carat. All these specimens were found in a gray cemented gravel underlying a stratum of "lava" or compact volcanic ashes, and were found in searching for gold.

*The Fourth Specimen*—Is from Cherokee Flat, in Butte County, and has been cut and set in a ring. Mr. Geo. E. Smith, of 605 Montgomery Street, San Francisco, who is an expert in diamonds and owns the specimen exhibited, informs me that he has seen fifteen crystals from this locality, and has authentic advices of at least forty, all of which have been found in deep gravel washings, and are believed to come from a stratum of about three feet thick, forming part of a mass of twenty-five to fifty feet of superincumbent material. When this special stratum of sandy materials is washed, the diamonds have been found. I have taken steps to obtain an authentic crystal from this place, which appears to be the most prolific locality of the diamond yet observed in California.

In the first volume of the Geology of California, page 276, Mr. Rémond is quoted as authority for the existence of diamonds at Volcano. If this locality is distinct from that at Fiddletown, near Volcano, we have at present, five authenticated localities of the diamond in California, from which specimens have been identified by mineralogists.

If a knowledge of the characteristics of this remarkable species was more common among the miners who work in the deep gravel diggings, no doubt this gem would be found to be more abundant and in more numerous places than is now suspected.

San Francisco, May 6th, 1867.

Professor Whitney, in reply to various inquiries made by members, remarked that there were probably some fifteen or twenty different localities in California where diamonds had been found; but these were all of small size, the largest which had come under his notice weighing only 7¼ grains: this was found at French Corral, near San Juan North. It was difficult to give any directions by which miners could infallibly recognize the diamond when they happened to meet with this gem. The crystalline form is very different from that of quartz, which is now, however, much less frequently mistaken for the diamond than it was formerly. Most of the crystals found in California, up to this time, have been twenty-four sided. The fact that the faces of the crystals are usually curved instead of being plane surfaces, is also characteristic of the gem in question. The hardness and specific gravity are also sure guides; but miners rarely have the means of getting at either of these characters accurately. It is commonly believed that the diamond can be struck a heavy blow, on an anvil, without breaking; but this is a mistake, resulting from confounding toughness with hardness. It is extremely doubtful whether washing the gravel for diamonds in California would pay, under any circumstances; and it is believed that such washings are not remunerative anywhere, except when performed by slave or convict labor.

Professor Whitney read a paper on the geological position of coal. The object of this paper was to show how completely the results of modern geological explorations and discoveries had done away with the old idea that valuable beds of coal are confined to any one member of the series of geological formations. The recent investigations of geologists in India, China, Australia, New Zealand, South America, and on the Pacific coast of North America, were noticed and commented on. It was shown that while the important coal fields of Eastern Europe and the Eastern United States are of palæozoic age, those of India, China and Australia, on the other hand, belong to the mesozoic series chiefly, although there are important deposits even as recent as the cainozoic or tertiary. Professor Whitney remarked on the distribution of the principal coal fields of the world into two great groups, on opposite sides of the globe: one of these is of palæozoic, and the other of mesozoic age. He referred particularly to the coal of the Pacific coast of North America, and gave a brief account of its geographical distribution and geological age, noticing particularly the fact that most of the valuable fields of that region belong to the cretaceous series, a geological formation which, in other parts of the world, has been found to be one of the most barren in combustible materials. In conclusion, the importance of coal discoveries in the region between the Rocky Mountains and California to the successful operation of the Pacific Railroad was explained, and the hope expressed that the geological expedition recently set on foot by the General Government, at the head of which is Mr. King, late of the California Survey, might be the means of giving to the world reliable information in regard to the coal resources of that region, of which we now know so little.

Prof. Whitney presented an elaborate paper "On the Natural System of the Igneous Rocks," by Baron Richthofen; he advised its reference to the Publication Committee, and that it should be made one of the "Memoirs" which the Academy contemplates publishing. It was so referred, and the committee was instructed to report on the feasibility of commencing the publication of a series of quarto Memoirs.

Prof. Whitney exhibited a canine tooth, obtained from the deep gravel deposits at Douglas Flat, near Murphy's, in Calaveras

County; it appears to be different from the teeth of any animal yet found on this coast, either living or fossil. He considered it as probably belonging to the hyæna; if so, this was the first notice of the occurrence of this animal on the American continent.

Dr. Cooper stated that Mr. Ridgeway, the zoölogist appointed to accompany the Government exploration of Russian America, when on that coast, a few years since, had found birds nearly identical with living species in Asia—a fact of much interest, since none of the same species are found on the eastern coast of America. There is here another suggestion of the former intimate relations between Western America and Eastern Asia.

### REGULAR MEETING, MAY 20th, 1867.

Vice President Ransom in the Chair.

Twenty-nine members present.

Messrs. John P. Cairns, J. W. C. Maxwell, Constantine Heusch, William Fischel, E. W. Burr, Archibald C. Peachy, J. P. H. Wentworth, C. P. Stanford, Henry Gibbons, Jr., M.D., and P. M. Randall, M.D., were elected Resident Members.

Donations to the Cabinet: Fossils from Mission Peak, Alameda County, by Mr. Bosqui; and from Japan, by Mr. Lorquin.

Donations to the Library: Jahrbuch der k. k. geologischen Reichsanstalt, Band XVI, No. 2, 1866. Bulletins de l'Académie Royale de Belgique, (2) XX, XXI, 1865–6. Annuaire, (of the same) 1866. Meteorologisch Jaarboek, uitgegeven door het kon. Nederlandsch Meteorologisch Instituut, 1865; two parts, long 4to, Utrecht, 1866. Die Regenverhältnisse des Königreichs Hannover, &c., von Dr. M. A. F. Prestel, Emden, 1864. Festschrift der naturforschenden Gesellschaft zu Emden, 4to pamphlet, Emden. Einundfünfzigster Jahresbericht der naturf. Gesells. zu Emden, 1865; 8vo pamphlet, 1866. Schriften der Gesells. zur Beförderung der gesammten Naturwissenschaften zu Marburg, Supplement Heft, (Claus, die Copepoden Fauna von Nizza) 4to, 1866. Monatsbericht der kön. Preuss. Akademie der Wiss. zu Berlin, 1865. Bulletin de l'Académie Impériale des Sciences de

St. Petersbourg, Tome IX, Feuilles 1–36. Mémoires de l'Académie Impériale des Sciences de St. Petersbourg, Tome IX, (complete) X, 1. Sur l'Etat de l'Atmosphere à Bruxelles, pendant l'Année 1865, par M. Ernest Quetelet. Geographical Catalogue of the Mollusca found west of the Rocky Mountains, prepared for the State Geological Survey, by J. G. Cooper, M.D. Burton's City of the Saints, presented by Gregory Yale, Esq.

Mr. Stearns read a paper entitled "Ancient Mining on Lake Superior," which reading was followed by a discussion on that subject, in which Dr. Cooper, Mr. Yale, Mr. Stearns and Mr. White took part.

Mr. Bolander exhibited a portion of a branch of *Pinus tuberculata*, and commented on the fact that two whorls of cones had been formed in last year's growth. Drs. Behr, Kellogg and Gibbons discussed various questions suggested by Mr. Bolander's remarks.

## REGULAR MEETING, JUNE 3d, 1867.

Vice President Stearns in the Chair.

Twenty-five members present.

Messrs. Tryon Reakirt, of Philadelphia, and Lorenzo G. Yates, of Alameda County, were elected Corresponding Members; and Messrs. G. H. Mumford and A. S. Gould, Resident Members.

Donations to the Cabinet: A Horned Frog, by G. Yale, Esq.; Specimen of *Cladophorus* from Fort Point, by Dr. Stivers; Section of the bark of *Sequoia sempervirens*, by Dr. W. P. Gibbons.

Mr. Stearns announced the death of M. Auguste Rémond, a member of the Academy, and formerly of the State Geological Survey.

Mr. Bosqui presented a communication from Mr. L. G. Yates, in regard to the remains of an elephant found near Mission San José.

Dr. W. P. Gibbons read a communication on the remains of a redwood forest in the Coast Range east of San Francisco. The subject of this paper was discussed by several of the members present.

Mr. Nystrom presented a paper on the origin of the Table Mountain in Tuolumne and Calaveras counties.

---

## REGULAR MEETING, JUNE 17th, 1867.

Vice President Ransom in the Chair.

Twenty members present.

Donation to the Cabinet: Specimens obtained in excavating on the Beideman tract, by G. Yale.

Mr. Gabb presented a communication on the "Geology of Lower California," which was referred to the Publication Committee, and ordered printed as one of the Memoirs of the Academy.

Mr. Gabb also communicated the following translation of part of a letter received by him from Sr. Don Antonio Raimondi, of Lima, Peru, with reference to some geological features of that country:

I have just received a letter from Professor Raimondi, accompanying a very interesting collection of fossils, sent through my lamented friend Mr. Rémond, but which I have not yet received. After remarking that he had not time to write a detailed account of the country to assist me in my determinations of the geological ages, he gives the following condensed but interesting description of the country, which I have considered of sufficient value to warrant its immediate publication. I translate this portion of the letter in full.

"Peru, or at least the great chain of the Cordillera which divides the whole of America into two parts, comprises various smaller chains, often very high, and here consisting of four, nearly parallel. The principal of these are two, one of which is the dividing line between the waters emptying into the Pacific on one side, and the tributaries of the Amazon on the other. This is what is properly called the Cordillera of the Andes, or the Western Cordillera. The other chain is called the Eastern Cordillera, and in some points is as elevated or even surpasses in height the true Cordillera. In the southern part of Peru, for example, it is entirely covered with perpetual snow, and contains very elevated peaks, including, in that part which is prolonged into Bolivia, the two colossi called Sorata or Illampu and Illimani. The Eastern Cordillera is of the greater geological age, appearing to be entirely composed of micaceous and talcose schists which have been metamorphosed by the elevation of the granites, those which have also introduced into these schists numerous veins of quartz, which in some places are quite rich in gold. This elevated chain has been cut very deeply by numerous rivers, which, taking their origin in the

Western Cordillera, traverse these immense formations of schists and granite through narrow gorges, and unite to form the large affluents of the Amazon.

"The Western Cordillera or true chain of the Andes is made up in nearly the whole of its length of rocks of a much more recent age. The principal formations are Cretaceous, Jurassic, Lias and Trias. Another group of rocks, probably Carboniferous, form the great basin of Lake Titicaca and a small spot on the heights of Huanta. This Cordillera has been metamorphosed by various eruptive rocks, the principal of which are porphyries and diorites. These have introduced innumerable metalliferous veins, rich in lead, copper and silver, and which have been worked in many places.

"The volcanic rocks are strongly developed in Peru, especially in the southern part, and have never been well studied. According to my opinion, they once formed an extensive chain, which, from its being composed of rocks easily disintegrated, has been in great part destroyed by the action of water, so that it is separated mostly by isolated hills; but from all that I have been able to see, it must have formed at one time an uninterrupted chain, as it appears in the central part of Peru, at a little distance from the Pacific Ocean, and afterwards it approaches almost insensibly the true Cordilleras; so that, near Arequipa, it is more than twenty leagues from the sea, but in following it to the south it nears the Cordillera, extending to Cruzalia, in the broken country of Moqueque and Tacna.

"Along the whole length of the coast, at a distance of one or two leagues from the margin of the ocean, rises a small chain of hills formed of granite, syenites and porphyries. This chain is called 'the Hills' (Lomas) and contains in places scattered spots of copper and a very little gold. On the same coast and on the adjacent islands, sedimentary rocks are rare, though they are nevertheless found at rare intervals. To the north, sedimentary rocks extend from Tumbes to the south of Payta, at the little cove of Tortugas, where there are many springs of fresh water in a hardened claystone, alternating with calcareous strata, which contain little seams of coal.

"From Secharra to near Lima there is no sedimentary formation. Near the port of Ancon, five leagues from Lima, in the island of San Lorenzo, near Callao, and in Chorillo, three leagues south of Lima, there are some stratified sandstones with a very few fossils. These formations appear to us to be either Jurassic or Liassic, but the study of the few fossils found will determine better their age.

"Near Arica, and three leagues to the interior from Iquique, where are the celebrated silver mines of Huantapaya, there have also been noticed sedimentary rocks belonging to the Oolite and Lias.

"In the elevated regions of the Cordillera are many traces of stone coal which, unlike those in the formation about Lake Titicaca, which I have already said belong to the true Carboniferous, are all of more recent age, belonging to the Jurassic and Liassic, as you will see by specimens from the Springs of Pariatambo."

## REGULAR MEETING, JULY 1st, 1867.

Vice President Ransom in the Chair.

Twenty members present.

Donations to the Cabinet: Native oysters, (*O. laticaudata*) also varieties of *Purpura lactuca*, from Dr. Cooper; cone of *Pinus contorta*, and branch and fruit of *Garrya elliptica* from Port Trinidad; eggs, cocoon, and animal of the California silk-worm, (*Saturnia Californica*) by Dr. Lanszweert; *Aristolochia Californica*, from Angel Island, by Mr. E. Brooks.

Mr. Stearns read a note from Professor W. P. Blake, stating that the fossil vertebræ which he exhibited at the meeting of November 18th, 1866, were not those of saurians, as he had supposed, but of one of the larger forms of *Delphinidæ*.

Mr. Stearns exhibited specimens of *Haliotis* from Monterey, which were evidently hybrid forms. Some remarks on the peculiarities and geographical distribution of these mollusks were made by Messrs. Stearns and Cooper.

Dr. W. P. Gibbons made some additional remarks, supplementary to his communication, at a previous meeting, on the extinct redwood forests of the Coast Ranges on the east side of the Bay of San Francisco. These remarks were followed by a discussion in which Messrs. Cooper, Kellogg, Bolander, Veatch, and Stearns took part.

## REGULAR MEETING, JULY 15th, 1867.

Vice President Ransom in the Chair.

Twenty-five members present.

Messrs. W. A. S. Nicholson, A. B. Stout, M.D., and C. W. McCormick, M.D., were elected Resident Members.

Donation to the Cabinet: Specimen of asbestos, from L. Ransom, Esq.

A collection of the shells of California, comprising in part the specimens belonging to the Academy and which had been sent to Mr. Carpenter to be named, was exhibited by Dr. Cooper, by whom they had been arranged for the Museum.

Dr. Gibbons made some remarks on the effects of the earthquake of October 6th, at Watsonville. He also spoke of the absence of worms from California fruit; and his remarks were followed by a discussion of the subject, in which Drs. Cooper and Behr took part.

Messrs. Stearns and Yale made some remarks on the ancient mines of the Lake Superior region, and the race by which they had probably been worked.

---

### Regular Meeting, August 5th, 1867.

Vice President Ransom in the Chair.

Twenty-three members present.

Donations to the Cabinet: A specimen of a Sole, from Dr. Behr; four hundred specimens of Chilean Plants, from Mr. Bolander.

Mr. Bolander gave an account of a recent visit made by himself to Humboldt County, and of his botanical observations in that region. The subject of the geographical range of the forest trees on this coast was discussed by Messrs. Behr, Cooper, Yale, Bloomer, and Williamson.

Dr. Gibbons called attention to the meteoric display to be expected about the tenth of the current month.

---

### Regular Meeting, August 19th, 1867.

Vice President Ransom in the chair.

Twenty members present.

Donations to the Cabinet: Fossils from Purissima, by Mr. Yale.

Donations to the Library: Memoirs of the National Academy of Sciences, Vol. I, 4to, Washington, 1866, and Annuals of the same for 1863, 1864, 1865, and 1866.

The subject of the distribution of forest vegetation was discussed by Messrs. Bloomer and Cooper.

Dr. H. Gibbons made some remarks on the distribution of clear and cloudy days throughout the year at San Francisco.

Mr. Stearns exhibited a species of Pholas, and made some remarks on its methods of boring. Dr. Cooper made some observations on the same subject.

## REGULAR MEETING, SEPTEMBER 2d, 1867.

President in the chair.

Twenty members present.

Donations to the Library: Washington Astronomical Observations for 1864, 4to, Washington, 1867. Report on Interoceanic Canals and Railroads between the Atlantic and Pacific Oceans, 8vo, 1867. Speech of Hon. Charles Sumner on the Cession of Russian America.

A letter from George Gibbs, Esq., transmitted through the Smithsonian, and urging the importance of collecting Indian crania on this coast, was read and commented on by Professor Whitney. He also exhibited a part of a jaw of *Oreodon*, sent from Montana, by Mr. Keyes. The precise locality where it was said to have been found is about twenty miles northeast of Bannock City, on Rattlesnake Creek, a branch of the Beaver Head. If there is no mistake in the locality, this is a very interesting occurrence, as the existence of these tertiary deposits characterized by bones of extinct mammalia (the White River beds) was not before known as far west, or at as high an elevation, as this.

Professor Whitney gave an account of his recent visit to Oregon, Washington Territory, Vancouver Island, and British Columbia. He spoke particularly of the volcanoes of that region, and remarked that he had ascertained, by rough trigonometrical measurements, that Mount Hood was at least two thousand feet lower than Mount Shasta. He was about to ascend the first-named peak, in order to measure it barometrically; but, on learning that Colonel Williamson was intending to do the same thing, during the present season, he proposed to await that gentleman's measurement, the result of which could not fail to be accepted by all as eminently trustworthy. Professor Whitney remarked that his journey had been undertaken chiefly with a view to the study of the "surface-geology," and that he would, on a future occasion, bring before the Academy the results of his observations.

Mr. Bolander made some remarks on the distribution of the redwoods and Big Trees in California, and exhibited a map, prepared at the office of the Geological Survey, on which the extent and position of the regions occupied by these two species of Sequoia were shown by colors.

Dr. Ayres remarked on explosive sounds heard by him recently, during perfectly clear weather, in the vicinity of Borax Lake. They seemed to come from beneath the surface, and recalled the subterranean explosions or noises mentioned in the Geology of California, Vol. I, as having been heard in the vicinity of Mount Helena.

---

## Regular Meeting, September 16th, 1867.

Vice President Ransom in the chair.

Twelve members present.

Donation to the Cabinet: Twenty-eight mineralogical specimens from Dr. A. B. Stout; mineralogical specimens from Mount Hood, by Col. R. S. Williamson.

The following paper was read:

### On the Height of Mt. Hood.

BY R. S. WILLIAMSON.

Having recently formed a party and visited Mt. Hood for the purpose of ascertaining its altitude, and as my determination of its height is much less than previous parties have made it, I think it proper to state somewhat in detail the nature of the observations and the method I have pursued to arrive at the number I adopt as a close approximation to its true height.

By the kindness of Gen. F. Steele, commanding the Department of the Columbia, the necessary transportation was furnished for the party, consisting of twelve persons, of whom my two assistants, Lieut. W. H. Heuer, U. S. Engineers, and Mr. John T. Best, were specially charged with the observations on the summit. We left Portland, Oregon, August 20th. and on the evening of the twenty-second arrived at a place on the slope of the mountain, where we camped, and from which, the next day, the ascent was made; seven of the party attempting to reach, and six reaching, the summit, where they remained from one and a-half to three hours.

From this camp to the summit and back ten hours were occupied, starting at 7:30, A.M. The weather was clear and pleasant, and had been so for several days before, and was so for several days after.

The instruments used at all the stations were made by James Green, of New York, were in perfect order, and most of them new. They consisted of cistern barometers reading to two thousandths of an inch, with attached thermometer, and open air thermometer, (dry and wet) with large divisions, so that they were easily read to tenths of a degree. All the barometers had been adjusted to or compared with the standard, and all agreed with it except the one at Astoria, which required a plus correction of three thousandths of an inch.

The stations used were Astoria, Fort Vancouver, Fort Dalles, camp on slope of Mt. Hood, and summit of Mt. Hood. Observations had been taken for several years at Astoria for me by Louis Wilson, U. S. Tidal Observer, at 7, A.M., 2, P.M., and 9, P.M., of every day, besides hourly observations for ten days or more of each month. The cistern of this barometer is fifty-three feet above mean low tide.

At Fort Vancouver observations of the same character were commenced July 1st of this year, and are still going on. At Fort Dalles similar observations have been made since July 10th.

The observations at the camp on the mountain slope were commenced at 7, P.M., on August 22d, and continued hourly (with few omissions) until 8, A.M., on the twenty-fourth. The barometer at the summit was hung up at 1:30, P.M., and allowed to stand a half hour in free air, but protected from the direct rays of the sun. It was then adjusted and observed at 2, P.M., 2:15, P.M., and 2:30, P.M., by Mr. Heuer and Mr. Best, independently, and the two records as shown to me were essentially the same. The mean reading of the barometer reduced to 32° Fahrenheit, was 19,941 inches, with an *observed* air temperature of 41°.7, and wet bulb of 31°.3. The height of Fort Vancouver above Astoria was computed from the mean of the simultaneous observations taken during the months of July and August. The height of the Dalles above Fort Vancouver was deduced from the corresponding observations during twenty-one days in July, together with those for the month of August. The height of the camp on the mountain slope above Fort Vancouver, and also the height of that camp above Fort Dalles, were then separately computed from the daily means of the observations taken at the three stations during August 23d. The difference between the two should give the same result as by the direct calculations between Fort Vancouver and Fort Dalles; but on account of the short period observed on the mountain camp, a plus correction of a little over eight feet was found necessary to the estimated height of that camp to make the three results agree.

It then remained only to calculate the height of the summit of Mount Hood above the mountain camp. The mean of the three observations of the barometer was assumed as the nearest approximation we can have to the mean pressure for that day, as the horary oscillation at the summit is unknown. With regard to the mean temperature for that day, we have no positive data to determine it. We cannot take the observed temperature, as the observations were taken during the hottest part of the day.

By consulting the hourly observations of the thermometer at the camp, I find the range there is between 63° and 43°.7, or nearly 20°; and supposing nearly as great a range of temperature on the summit, I have assumed the mean temperature then for that day to be 34°.

The following is the final result of the computations:

| STATIONS. | INTER. ALTS. | SEA LINE. |
|---|---|---|
| Sea level at mean low tide | ...... | 0 |
| Astoria | 53 | 53 |
| Fort Vancouver | 79 | 132 |
| Camp on mountain slope | 5,820 | 5,952 |
| Summit of Mount Hood | 5,273 | 11,225 |

The computations are made with new tables which will shortly be published, and which give results similar to Plantamour's formula, based on Regnault's constants. They give results somewhat higher than if Guyot's tables had been used, the latter giving the height of the summit, 11,185 feet.

On our return I took a single observation at what is called "Government Camp," about four miles below the camp on the mountain slope, and another at a place called Stumpville, some eight miles further on the road towards Portland. The results give for the former place 3,864 feet, and for the latter 1,830 feet above the sea level.

The instruments used on the mountain have been returned in excellent order, and compared with the one at Fort Vancouver with most satisfactory results.

It may be asked: Why is it that the results here given differ so widely from some previous estimates? Mount Hood is said to be, by Mitchell's School Atlas, 18,361 feet, and the Rev. Geo. H. Atkinson with a party, ascended to the summit in August of last year, boiled water with a spirit-lamp, found that the thermometer read 180°, and therefore concludes the mountain is 17,600 feet, and Government Camp 4,400 feet above the sea. The reason is, that the instruments used are unreliable, and this method of computing the altitude defective. With a boiling point apparatus (or thermo-barometer as it is called) of the most approved kind, the results by boiling water are far inferior to those by the cistern barometer; but if the observations are made with a common thermometer, with small spaces for degrees, as was the case in this instance, and the instrument not protected from drafts of air, the results are utterly unreliable, and therefore worse than worthless.

Apart from the observations here described, there are other evidences to show that the determination of the height of this mountain here given is not underestimated. Col. B. C. Smith, one of our party who reached the summit, had this year ascended Mount Shasta, a mountain measured by Prof. Whitney to be 14,440 feet. The Colonel states that he feels confident, from the comparative ease with which he ascended Mount Hood, that it is of much less altitude than Mount Shasta.

On Mount Hood butterflies were found within a thousand feet of the summit. Finally, Prof. Whitney and others, from rough triangulations, have estimated it be about 12,000 feet.

It is to be hoped that other parties with good instruments will take further observations on this mountain. As the height of Fort Vancouver and Fort Dalles are known, and as these are now permanent meteorological stations, further observations on Mount Hood can be referred to one of these stations as a base, and good results obtained.

While another set of such observations may produce slightly different results, I think they will not differ one hundred feet from the estimate here given.

Dr. Gibbons exhibited a specimen of *Euphorbia lathyris*, and remarked upon its distinguishing characters.

## REGULAR MEETING, OCTOBER 7th, 1867.

Dr. J. G. Cooper in the chair.

Twelve members present.

Donation to the Cabinet: Salt from a manufactory on the Columbia River, near Portland, Oregon, by Mr. Victor.

## REGULAR MEETING, OCTOBER 21st, 1867.

President in the Chair.

Twenty-three members present.

Mr. J. G. Burt was elected a Resident, and Professor W. D. Alexander, of Honolulu, Hawaiian Islands, a Corresponding Member.

Donation to the Cabinet: A large number of Californian plants, collected and presented by Messrs. Bolander and Kellogg.

Donations to the Library: Humboldt and Bonpland's Botanical Observations in South America, four vols. 8vo., Paris, 1822, by Mr. Bolander.

Professor Whitney read extracts from letters recently received from Mr. Dall, dated at "St. Michael's, Russian America, August 14th, 1867," and addressed to the Academy and to himself. The following are some extracts from these letters:

"I have traveled on snow shoes, with the thermometer from 8° to 40° below zero, about four hundred miles. I have paddled in open canoes up stream six hundred and fifty miles, and down 1,300 miles. I have obtained 4,550 specimens, including a set of the rocks from Fort Youkon to the sea, sufficient to determine the geological formations for 1,300 miles. The only fossiliferous

> beds are on the Youkon, and they extend about sixty miles. They are brown sandstones, containing bivalve mollusca and vegetable remains. There is a small seam of coal thirty miles below the bend, and thin shale above and below. The coal is of good quality; but there is so little of it that it is worthless. These are the only fossiliferous strata I have thus far found. The rocks above and below are all azoic and nonstratified, excepting a little hard blue or black slate. Granite, and especially mica, are very rare. I found a pebble containing the well known fossils of the Niagara limestone on the beach near Fort Youkon. Fossil wood and bones and teeth of *Elephas* and *Ovibos moschatus* are common over the country. There is a broad patch of volcanic eruptive rock on the river near the lower bend, and it extends to the sea. The islands of St. Michael and Stuart are formed of it, and it is roughly columnar on the former near the Fort."
>
> "I have looked carefully for glacial traces, and so far have found absolutely none."

Mr. Dall adds that it is his intention to spend another year in Russian America, working at his own expense, in order to finish the explorations commenced by himself, and which the failure of the Telegraph Company rendered it impossible for him to continue officially.

Dr. Cooper and Professor Whitney discussed the question whether the volcanoes of Oregon and Washington Territory were to be classed as active. The evidence on this point seemed very conflicting, so far as showers of ashes are concerned. There is no doubt, however, of the existence of solfataric action on Mount Hood, Mount St. Helens, and probably on Rainier and Baker.

Professor Whitney exhibited some photographs and stereographs, taken for the Geological Survey by Mr. W. Harris, in the Upper Tuolumne Valley, near Soda Springs, Mount Dana, Mount Hoffmann, and Mount Lyell. He also presented the following account of a remarkable portion of the Tuolumne Valley, which forms almost an exact counterpart of the Yosemite. It is by Mr. Hoffmann, the head of a party of the Geological Survey, by which it was explored last summer:

## Notes on Hetch-Hetchy Valley.

BY C. F. HOFFMANN.

Tuolumne Valley, or Hetch-Hetchy, as it is called by the Indians (the meaning of this word I was unable to ascertain) is situated on Tuolumne River about fifteen miles in a straight line below Tuolumne Meadows and Soda Springs, and about twelve miles north of Yosemite Valley. Its elevation above the sea is from 3,800 to 3,900 feet, a little less than that of Yosemite. The valley is three miles long running nearly east and west, with but little fall in this distance. Near its center it is cut in two by a low spur of shelving granite coming from the south. The lower part forms a large open meadow with excellent grass, one mile in length, and gradually increasing from ten chains to a little over half a mile in width, and only timbered along the edges. The lower part of this meadow terminates in a very narrow cañon, the hills sloping down to the river at an angle of from 40° to 60°, only leaving a channel from six to ten feet wide; the river in the valley having an average width of about fifty feet. This is the principal cause of the overflow in spring time of the lower part of the valley, and probably also has given rise to the report of there being a large lake in the valley. Below this cañon is another small meadow, with a pond. The upper part of Hetch-Hetchy, east of the granite spur, forms a meadow one and three-fourths miles in length, varying from ten to thirty chains in width, well timbered and affording good grazing. The scenery resembles very much that of the Yosemite, although the bluffs are not as high, nor do they extend as far. On the north side of the valley, opposite the granite spur we first have a perpendicular bluff, the top of which is 1,800 feet above the valley; the talus at the base is about five hundred feet above the valley, leaving a precipice of about 1,300 feet. In the spring when the snows are melting a large creek precipitates itself over the western part of this bluff. I was told that this fall is one of the grandest features of the valley, sending its spray all over its lower portion. It was dry, however, at the time of my visit. The fall is 1,000 feet perpendicular, after which it strikes the debris and loses itself among the rocks. About thirty chains further east we come to the Hetch-Hetchy fall; its height above the valley is 1,700 feet. This fall is not perpendicular, although it appears so from the front, as may be seen from the photograph by Mr. Harris. It falls in a series of cascades at an angle of about 70°. At the time of my visit the volume of water was much greater than that of Yosemite fall, and I was told that in the spring its roarings can be heard for miles.

Still further east we have two peaks, shaped very much like "The Three Brothers," in the Yosemite. Their base forms a large, naked and sloping granite wall on the north side of the valley, broken by two timbered shelves, which run horizontally the whole length of the wall. Up to the lower shelf or bend, about eight hundred feet high, the wall, which slopes at an angle of from 45° to 70°, is polished by glaciers, and probably these markings extend still higher up, as on entering the valley the trail followed back of and along a moraine for several miles, the height of which was about 1,200 feet above the valley. The same polish shows itself in places all along the bluffs on both sides, and particularly fine on the granite spur crossing the valley. There is no doubt that the largest branch of the great glacier which originated near Mt. Dana and Mount Lyell, made its way by Soda Springs to this valley. A singular feature of this valley is the total absence of talus or debris at the base of the bluffs, excepting at one place in front of the falls. Another remarkable rock, corresponding with Cathedral Rock in the Yosemite, stands on the south side of the valley, directly opposite Hetch-Hetchy fall; its height is 2,270 feet above the valley. The photograph by Mr. Harris will give some idea of this rock.

At the upper end of the valley the river forks, one branch, nearly as large as the main river, coming from near Castle Peak, the main river itself from Soda Springs. About half a mile up the main cañon, the river forms some cascades, the highest being about thirty feet.

The valley was first visited, in 1850, by Mr. Joseph Screech, a mountaineer of this region, who found it occupied by Indians. This gentleman informed me that, up to a very recent date, this valley was disputed ground between the Pah Utah Indians from the eastern slope and the Big Creek Indians from the western slope of the Sierras; they had several fights, in which the Pah Utahs proved victorious. The latter still visit the valley every fall to gather acorns, which abound in this locality. Here I may also mention that the Indians speak of a lake of very salt water on their trail from here to Castle Peak. Mr. Screech also informed me of the existence of a fall, about a hundred feet high, on the Tuolumne River, about four miles below this valley, and which prevents fish from coming up any higher. The climate is said to be milder in winter than that of the Yosemite Valley, as is also indicated by a larger number of oaks and a great number of *Pinus Sabiniana*. The principal tree of the valley is *Pinus ponderosa;* besides this we have *P. Sabiniana*, Cedar, *Q. Sonomensis*, *Q. crassipocula;* also poplar and cottonwood.

The valley can be reached easily from Big Oak Flat by taking the regular Yosemite trail, by Sprague's Ranch and Big Flume, as far as Mr. Hardin's fence, between south and middle fork of Tuolumne River, about eighteen miles from Big Oak Flat. Here the trail turns off to the left, going to Wade's Meadows or Big Meadows, sometimes called Reservoir Meadows, the distance being about seven miles. From Wade's Ranch the trail crosses the middle fork of Tuolumne and goes to the Hog Ranch, five miles; thence up divide between the middle fork and main river, about two miles, to another little ranch called "The Cañon." From here the trail winds down through rocks for six miles to Tuolumne Cañon. This trail is well blazed, and was made by Mr. Screech and others, for the purpose of driving sheep and cattle to the valley. The whole distance from Big Oak Flat is thirty-eight miles.

Another trail equally good, but a little longer, leaves the Yosemite trail about half a mile beyond the crossing of the south fork, thence crosses the middle fork within about one and a half miles of the south fork crossing, and follows up the divide between the middle fork and the main river, joining the first-named trail at the Hog Ranch.

## REGULAR MEETING, NOVEMBER 4th, 1867.

President in the Chair.

Thirty members present.

George C. Johnson was elected a Resident Member.

Donations to the Cabinet: Two packages of plants from France and Australia, by Mr. Bolander; these plants were collected by Dr. F. Müller, Director of the Botanical Garden at Melbourne, and by Réné Le Normand, of Vire, France, and sent to Mr. Bolander in exchange for Californian plants.

Dr. J. Blake read the following:

## On the Organs of Copulation in the Male of the Embiotocoid Fishes.

BY JAMES BLAKE, M.D., F.R.C.S.

Some months since I presented a communication to the Academy pointing out the manner in which the fœtus of the embiotocoid fishes was nourished whilst it was being developed within the ovisac. (See p. 314.) I there stated that the ingress of water into the ovisac would not take place at all freely, as the organ communicated with the surface by a narrow canal surrounded by muscular fibres. This structure of the oviduct would evidently oppose an obstacle to the entrance of the semen into the ovisac for the purpose of impregnation, unless some means exist by which the ventral surfaces of the fish can be maintained in contact during the act of copulation, as the penis consists of a slightly developed tubercle which cannot penetrate for any distance into the oviduct. From the direction of the orifices of the penis and oviduct it is evident that anything like a perfect contact of these organs can only be maintained whilst the fishes are in a reversed position, so that the head of one fish is towards the tail of the other. In order that contact may be maintained whilst in this position, we find the caudal fin of the male fish furnished with certain appendages which enable it to give a firm hold to the ventral fins of the female, so that close contact of the ventral surfaces can be maintained. These appendages are of two kinds. In *Embiotoca, Damalichthys* and some other genera, we find a well developed mammary elevation situated near the anterior part of the anal fin on both sides, terminating in front by a teat-like process. In *Amphisticus, Holconotus* and some other genera, this mammary appendage is wanting; but its place is supplied by a bony transverse plate with serrated edges, inserted in the fin some distance farther back and parallel to the fin rays. In addition to these plates there are also found cartilaginous ridges with roughened borders, placed in front of the plates, and running parallel with the edge of the fin. I think there can be no doubt but that these fin appendages serve the purpose I have assigned to them, for on placing the fish in the reversed position, with the orifice of the oviduct and penis in contact, it will be seen that they enable the ventral fins of the female to secure a firm hold on the anal fin of the male, so as to keep the fish in contact during the process of copulation. At the season of copulation, the anterior surface of the anal fin in the male becomes covered with a thick layer of firm epithelium. As this commences at a short distance from the ventral attachment of the fin, a well marked groove is formed at the base of the fin, which affords an additional hold for the ventral fin of the female. After the season of copulation is over, and the testicles regain their quiescent state, this epithelium almost disappears. At the same time the mammary sack diminishes very much in size, so that when the testicles are reduced to their smallest size, hardly a trace of the sack remains. One or the other of these forms of appendages have been found on the anal fin of the male in all the species of embiotocoid fishes I have examined.

Mr. Stearns exhibited some fossils collected by Mr. Schmidt near Orleans Bar, Klamath County.

Professor Whitney exhibited some peculiar ores from Nevada and Mexico. Those from Nevada were antimoniate of lead, containing considerable silver. This occurs in Humboldt County, and in sufficiently large quantities to be mined and smelted, with success as is stated, the value of the silver being about $100 per ton. The Mexican ore is a pure oxide of antimony, which will be more fully described hereafter. It occurs in several mines in the northern provinces.

Professor Whitney made some remarks on the mineral species occurring in California and on the Pacific Coast of America in general. The following is an abstract of these remarks:

He stated that the number of minerals occurring in California, and on the Pacific coast in general, taking the country from Northern Mexico to British Columbia, was quite small in proportion to the area of the region. Especially among the silicates is there a great deficiency in species, and very few of those which do occur are found of sufficiently well crystallized form to be valuable as cabinet specimens.

The total number of species (following the fourth edition of Dana's Mineralogy for names, etc.) believed to exist on the Pacific coast, including Northern Mexico, Arizona, California, Nevada and Oregon, is one hundred and ten, of which, however, thirteen are somewhat doubtful. Of the one hundred and ten, there are eighty-nine which occur in California. Some of the mineral species most common in other parts of the world, and especially in mining regions, are either entirely unknown here, or else exceedingly rare. Thus *barytes*, which is so abundant a veinstone in England and Germany, is almost unknown in the Sierra Nevada, having been only found in one or two localities, and there in small quantity. Fluor is entirely wanting in the Sierra Nevada, although found in some quantity in Arizona and Nevada. Not a trace of this elsewhere so common mineral has been found, so far as known, in California.

Among the silicates most universally diffused, but which are up to this time entirely unknown in California, the following may be mentioned as some of the most prominent: beryl, topaz, zircon, Wollastonite, scapolite, spodumene, Allanite, iolite, staurotide, kyanite, spinel, nepheline, datholite and all the zeolites, in other countries so abundant where volcanic rocks occur. Not a well defined specimen of a zeolite has yet been found within the borders of California.

Another curious fact in the mineralogy of California is the occurrence of some mineral species which are common as ores in other mining countries, and which in California, or at least in the mining region of the Sierra Nevada, are disseminated through a great number of localities, but nowhere exist in workable quantity. Galena and blende may be particularly referred to as occurring in this way. There is hardly a gold-bearing vein in the Sierra which has not some galena and blende in fine particles in the veinstone; but not a locality is known where the quantity of either of these ores is anything like sufficient to justify mining, even were the other conditions as favorable as in the Eastern States or in Europe. Galena occurs in considerable quantity in the extreme south-eastern portion of the State, or just over the borders, in Arizona and Nevada; but no considerable deposit of zinc blende has yet been made known anywhere in the Pacific States or Territories; nor is any other ore of zinc known to occur in workable quantity on this coast.

The mineral region with which ours most nearly agrees, in the character of its ores and mineral substances, is that of the South American Andes, especially of Chile. In Mr. David Forbes' recent catalogue of the Chilean minerals, there are about two hundred species enumerated, of which about sixty have hitherto been discovered in California and the other Pacific States and Territories. The Chilean mineral list, like that of California, is remarkable for the absence of many of the almost universally distributed silicates mentioned above as wanting in the Pacific States, namely: beryl, topaz, zircon, Wollastonite, Allanite, iolite, staurotide, kyanite, spodumene, spinel and datholite. Many other silicates, abundantly distributed throughout other portions of the world, might be mentioned as entirely wanting along the whole Pacific Coast. Several of the more common zeolites are found in the Chilean list, which are wanting in California; while several others are equally wanting in both countries. Among the common zeolites found in Chile which have not yet been discovered in California are Prehnite, stilbite, Laumontite and scolecite; while analcime, harmotome, Thomsonite, natrolite and Heulandite are wanting there as well as here.

It is evident, from a comparison of the mineral lists of the States situated along the Pacific Coast of North and South America, that there has been a most remarkable resemblance in the conditions which have influenced the formation and segregation of the accidental minerals now found accompanying the stratified and eruptive masses throughout the whole vast extent of the regions in question. This is another of the facts which go to show the unity of the Cordilleras of North and South America as a geological result.

Mr. Bolander stated that the absence of many mineral species from this coast found its parallel in a similar absence of many botanical groups.

Dr. Cooper did not think there was any poverty with respect to animal species on this coast, and suggested that the absence of certain groups of plants might be due to the absence of certain appropriate mineral constituents from the soil.

Dr. Behr thought that the Californian lepidoptera more nearly conformed to European and Mexican types than to those of the Eastern States.

---

## REGULAR MEETING, NOVEMBER 18th, 1867.

President in the chair.

Twenty-six members present.

Messrs. R. H. Stretch and Gustav Holland, M.D., were elected Resident Members, and Mr. L. C. Schmidt of Eureka, Humboldt County, a Corresponding Member.

Donations to the Cabinet: A specimen of Coral from Mr. Eckley.

Donation to the Library: Mining Claims and Water Rights, 8vo, San Francisco, 1867, by Gregory Yale.

Professor Whitney read the following communication, supplementary to the one presented at the previous meeting.

The subject of the relation of the accidental minerals occurring on the Pacific coast, was brought forward by me at the last meeting, and I wish now to add a few words in regard to the elementary substances occurring in California, an inquiry which will also afford us some interesting data for comparing the geological and chemical conditions prevailing through the great chain of the Cordilleras of North and South America.

I find on carefully tabulating the facts observed by the Geological Survey, in regard to the mineral combinations existing on the coast, that of the sixty-four elementary substances existing in nature, so far as yet known to chemists, there are only thirty-six which have been proven to occur in California, in mineral combinations.

Those which are wanting here are the following: bromine, glucinum, cadmium, cæsium, cerium, didymium, erbium, fluorine, iodine, indium, lanthanum, lithium, niobium, norium, palladium, ruthenium, rubidium, strontium, tantalum, terbium, thallium, thorium, uranium, vanadium, bismuth, tungsten, yttrium, zirconium (28.)

Of elementary substances occurring in the adjacent States, and not yet detected in California, there are, so far as I know, only three, namely: bismuth, fluorine and tungsten. This would make twenty-three elements wanting on the Pacific Coast of North America. Of these a few are extremely rare, in general, and would hardly be expected to occur here. Among these are didymium, erbium, indium, lanthanum, norium, thorium. But there are others, the absence of which is indeed quite surprising. Fluorine, for instance, is an element of extremely wide distribution, and one which occurs in great quantity in most mineral countries. Here it will probably hereafter be detected in our micas, and perhaps in other combinations, and also in mineral and sea water; but its most abundant source, fluor-spar, seems entirely wanting in this State.

Bismuth is another element of common occurrence in various combinations, but it has not yet been detected in California. A few minute scales of a mineral that I determined to be bismuth-silver, from the Twin Ophir mine, Nevada, is the only authentic instance I know of thus far, of the occurrence of this element on the Pacific coast. Tungsten, uranium and vanadium, are tolerably widely disseminated; the latter, however, less so than the former. No trace of either has yet been found on this coast north of Mexico; of strontium, zirconium, and glucinum, the same may be said. If we now compare the distribution of the elements in the South American Andes with that on this coast, we shall find some striking points of resemblance; and to a large extent, either the absence, or else the great rarity of several of the elementary substances not seen in other mineral regions, is a fact which holds good along the whole extent of the American Continent on the Pacific side. Fluorine, in combination with calcium, is almost as rare in Peru, Bolivia, and Chile, as on this coast. Indeed, it was formerly supposed by Domeyko not to occur at all in Chile, but recently one or two localities, where it is found in small quantity, have been made known. Tungsten occurs in Peru at one locality in the form of wolfram, and in Chile in one or two localities, also in Lower California, but its combinations are extremely rare along the whole coast. The same may be said of uranium. Strontium and zirconium have not yet been discovered in Chile or Peru, although the former occurs in one locality in New Grenada, and glucinum has only recently been found in Chile in very minute quantity in one locality. No combination of lithium is yet known on the Pacific coast.

Among the leading facts connected with the occurrence of mineral substances and the elementary bodies on the Pacific coast, and especially in the Cordilleras of North and South America, the following may be mentioned as generally applicable to the whole of the vast region extending frem British Columbia to Chile:

1st. The paucity of species considering the extent of the region as compared with other parts of the world, and especially with other mineral regions.

2d. The remarkable absence of the prominent silicates, and especially of the zeolites.

3d. The absence of a large number of the elementary substances, and the paucity of several others of very common occurrence in other mineral regions.

4th. The very wide spread and abundant occurrence of the precious metals, gold and silver, and the not uncommon occurrence of platina.

5th. The great abundance of ores of copper, and the comparative absence of tin, lead, and zinc.

6th. The similarity in the mineralized condition of the silver—antimony and chlorine being prominent mineralizers of this metal—while in Chile the rarer combinations of iodine, bromine, and selenium occur, these latter being as yet unknown north of Mexico.

7th. The absence or paucity as veinstone, or gangue, of one of the most prominent minerals occurring as such in other mineral regions, namely, fluor; to which it may be added, that both calcite and barytes are extremely rare as veinstones in California, and to judge from all the Mexican and Chilean collections that I have seen, well crystallized specimens are very rare in those countries.

8th. There is no elementary substance, and but few mineral species peculiar to the Pacific coast, so far as yet ascertained.

Professor Whitney remarked on the depression of Death Valley, the sink of the Amargosa River, below the level of the sea. Recently it has been repeatedly stated in the newspapers that no such depression really existed, and that, in point of fact, the valley in question was several thousand feet above the sea level, Mr. Gabb being cited as authority.

The valley visited by Mr. Gabb, however, was not, it appears, the real Death Valley, but one to which that name was given by an explorer by mistake. The true Death Valley is the sink of the Amargosa, while the one visited by Mr. Gabb is near the head of that river. The barometrical observations on which the statement of the depression of the real Death Valley is based were taken, in 1861, by a party of the California Boundary Survey. The observations were made with a barometer, which was compared before and after being used, with a standard, by Colonel R. S. Williamson, by whom also the computations and reductions of the observations were made; there was also a station barometer at the time on the Colorado, at no great distance, and this instrument was in good order. Thus it will be seen that the conditions were, in most respects, exceptionably favorable for a correct measure of the altitude of the valley, and it may be safely assumed that its depression below the sea level is not far from one hundred and seventy-five feet, as stated on Colonel Williamson's authority, in the Geology of California, Vol. I. To secure a more reliable result, it would be necessary to have a long series of observations taken there with a well-adjusted instrument, and it would be desirable also to have a station barometer on the Colorado, or at some other not too distant point. It will probably be a long time before these favorable conditions are secured; and, in the meantime, Col. Williamson's result must be received as a close approximation to the actual amount of the depression of this very remarkable locality.

Mr. Bolander, referring to a previous enumeration of pine species in California, submitted by him, stated that he must now reduce the number of true species by one, leaving the total at only fifteen. He also remarked upon the species of fir in this State, enumerating four only as being strongly marked. He showed the leaves and seeds of two species, and commented upon the mistake of Murray in asserting that there is a fifth species, which he calls *Picea magnifica*, but which is really *Picea amabilis*. Mr. Bolander thought the tendency to multiply species erroneously was attributable to a desire to make a market for seeds, those of new species being always in demand at good prices.

## Special Meeting, November 27th, 1867.

President in the Chair.

This meeting was called for the purpose of hearing from Mr. George Davidson, Assistant U. S. Coast Survey, an account of his recent trip to Alaska, at the head of a party organized by Professor Peirce, Superintendent U. S. Coast Survey, to make a partial scientific reconnoissance of that region. Mr. Davidson gave an interesting account of the operations of the party, and a synopsis of their observations. These will be found at length in his official report, to be printed by order of Congress.

At the conclusion of Mr. Davidson's remarks, the Academy passed a vote of thanks to Mr. Davidson and Professor Peirce, Superintendent of the Coast Survey, for the opportunity which had thus been afforded of hearing the results of an expedition of so much interest to the scientific world.

Dr. Kellogg, who accompanied the party as botanist, added some remarks on the Flora of the northwestern coast of America.

## Regular Meeting, December 2d, 1867.

President in the Chair.

Thirty-five members present.

Messrs. S. W. Holladay, Henry R. Goddard, and Henry K. Moore, were elected resident members.

Donations to the Library: Bulletin de la Société Imperial des Naturalistes de Moscow, 8vo., Moscow, 1866.

Professor Silliman read the following notices:

### Note on three new Localities of Tellurium Minerals in California, and on some Mineralogical Features of the Mother Vein.

BY B. SILLIMAN.

(*a*.) Tellurium Minerals.—It is well known to mineralogists and others that in the Melones Mine, on Carson Hill, there occurs, in considerable abundance, a tellurium compound which has been called Sylvanite by some mineralogists, but apparently without sufficient authority. It occurs in one of the veins on the Melones property, associated with Dolomite and quartz, in what appears to be a gneissic rock; but the mine being under water I am dependent on the specimens kindly furnished me by the intelligent proprietor, Mr. G. K. Stevenot, for my knowledge of the gangue.

At the "Golden Rule" Mine, on the mother lode near Poverty Hill, in Tuolumne County, I detected in August last the same tellurium minerals which are found at Carson Hill in the Melones. The veinstone here is an argillite, with thread-like veins of quartz crossing the cleavages of the slate, and in these *filons* of quartz gold is seen in beautiful specimens. It was in this association that I detected two or three small groups of brilliant crystalline plates, identical in appearance and physical characters with the Melones mineral, which has been called Sylvanite, and affording the same blowpipe reactions.

At the Rawhide Rancho, a mine near Jamestown, on the mother lode, of which I have had occasion to make a careful study, there occurs a deposit or shoot of very rich sulphides containing copper, antimony, iron, arsenic, with gold, silver and tellurium. This ore has in general a bronzy, blackish appearance; shows often free gold in scales of a blackish yellow color, and appears to be a kind of fahlerz, or gray-copper ore, the value of which in silver and gold rises to one thousand dollars per ton, (2,000 lbs.) or even higher. Associated with this ore are brilliant sectile, flexible scales of the same tellurium compound which occurs at Stanislaus and Golden Rule, but in the Rawhide Mine intimately blended with the blackish sulphides before-named—occasionally in nests or small bunches with metallic gold. The blowpipe readily detects in this ore antimony, arsenic, tellurium, copper, iron, manganese, lime, magnesia, chromium, aluminum, gold and silver. It is only in portions containing dolomite and the peculiar greenish mineral, so characteristic of the mother lode, that lime, magnesia, alumina, and chromium are detected. In portions of the fahlerz-like mineral which appear nearly pure, the blowpipe detects only antimony, arsenic, copper, iron, and manganese.

Having transmitted characteristic specimens of these ores, with other interesting California species, to Professors Dana and Brush, at New Haven, these mineralogists inform me, by letter just received, that the tellurids above-named appear to be referable to a new species hitherto undescribed, and Prof. Brush proposes to undertake an analysis of it upon the specimens transmitted by me, which are barely sufficient for the purpose. It is a tellurid of silver and gold, containing more silver than gold. Associated with it is a white cleavable mineral which Prof. Brush thinks may prove to be native tellurium; this is in the Melones and Golden Rule specimens.

*Hessite.* I obtained from the Reist Mine, on the northeasterly end of Whisky Hill, Tuolumne County, a very small crystal corresponding in its physical characters to the extremely rare telluric silver, known to mineralogists as *Hessite.* It occurs in the auriferous slates to the east of the main vein; the slates being opened here for a width of seventy-five feet as an open cut. My attention was called to the existence of this species at the Reist Mine by Mr. D. T. Hughes, of Tuolumne County, who informed me that there was an interesting mineral species there containing, as he believed, tellurium, and that masses of it, half an ounce in weight, had been obtained some years since. Unfortunately these specimens fell into ignorant hands, and were destroyed in idle attempts to determine the nature of the substance. On visiting the locality, which is within one mile of the Rawhide Rancho, and on the opposite side of Table Mountain, I found that the proprietor was exploring in a different part of the open cut from that where this species was found, the place being under water. Fortunately in a collection of minerals from Whisky Hill, formed by Mr. Williams, one of the proprietors, and preserved in his house there, I was able to detect one small mass of the Hessite which Mr. Williams divided with me. This Mr. Hughes recognized as identical with the larger masses he had obtained at this mine some years since.

Prof. Bush, in his letter to Prof. Silliman, of October 29th, recognizes this species as Hessite. The specimen was associated with native gold which had been amalgamated and heated, but the constitution of the Hessite did not seem to be affected thereby.

"*Tellurid of Silver*" is mentioned by Blake, in his list of California species, as found by him near Georgetown, in El Dorado County, in 1854, washed from the gold drift, but the parent vein had never been found.—Ross Browne's Report, 1867, p. 209.

It appears therefore, from the present state of our knowledge, that a compound of gold and silver tellurium belonging probably to a new species has been detected in three localities upon the mother vein, and associated with it in two of these, probably also native tellurium; and that Hessite (the tellurid of silver) has been found in place in one locality and in the drift in another. I have also detected the foliated tellurium in extremely minute quantity in one of the mines at Angels, and I mentioned in a publication, in 1864, its probable occurrence among the ores of the Josephine and Pine Tree Mines of Mariposa. A careful scrutiny will probably detect those compounds of tellurium at other points when the mother vein is opened, as at Blue Gulch, Quartz Mountain, and Whisky Hill. I have already recognized the blackish antimonial copper sulphides at the App Mine and Silver's Mine, and in the croppings on the surface of Whisky Hill. Indeed it may not be too much to state that these ores appear to be somewhat characteristic of those portions of the mother vein occurring south of Angels, and especially wherever it is inclosed in magnesian rocks.

Genth has named a species *Melonite*, from Melones Mine, which he says is a tellurid of nickel. I have not been able to recognize this compound among those ores of the Melones, which I have seen.

(*b*.) SOME MINERALOGICAL FEATURES OF THE MOTHER VEIN.—From the opportunity I have had of studying the mother vein, I arrive at the general conclusion that its mineralogical characteristics vary greatly with the chemical constitution of the rocks which inclose it. Wherever the serpentine or talcose and calcareous rocks from the inclosing walls, or are near it, the mineral contents of the vein are essentially different from those observed where the inclosing rocks are argillites, or syenites and diorites.

These we find at Mariposa, in the Josephine and Pine Tree Mines, at Peñon Blanco, Maxwell Creek, Blue Gulch, Quartz Mountain, Silver's, Whisky Hill, Rawhide, Chapavele Hill, Carson Hill, Angels, and Placerville—at all which places I have examined the mother lode with more or less care—a peculiar light apple-green mineral, occurring in scales, associated with iron pyrites in small and brilliant pentagonal dodecahedrons and implanted in a gangue of dolomite mingled with quartz. The dolomite is of the variety known as ankerite, and by its decomposition, which seems hastened by the oxidation of the associated pyrites, gives origin to those highly characteristic masses of brown and reddish-yellow iron gossan which form the characteristic feature of the outcroppings of those portions of the mother vein just enumerated. These gossans always retain the bright green mineral before alluded to unchanged, as also cellular quartz which discloses in its rhombic cavities the form of the decomposed crystals of dolomite or ankerite whose removal has left the vacant spaces. Before decomposition this triple carbonate of lime, magnesia, and iron is brilliantly white, and its real chemical character would never be suspected.

The green mineral, so far as I can ascertain, has never been described, although it has often been noticed. It has been called by some, *nickel gymnite*, and I have once distinguished it by this name in a mining report. But this is a misnomer which I take this occasion to correct; nickel gymnite of Genth, found at Texas, Penna., is a hydrous silicate of magnesia, lime, and nickel. The species so characteristic of certain portions of the mother vein is anhydrous, and contain no nickel.

MARIPOSITE (Provisional Name). Before the blowpipe it yields evidence of the presence of the protoxides of iron, lime, magnesia, and potassium; of the sesquioxdes of chromium and aluminum with carbonic, silicic, and sulphuric acids. The oxide of manganese and sulphuric acid exist only as traces. The mineral is probably new, and must be referred to the mica section of an hydrous silicate. Should it, on a careful chemical examination, prove to be new, I would suggest the name *Mariposite* as an appropriate name for it, as it was on the Mariposa estate that it first attracted my attention, and where it exists in great abundance.

This species which is so characteristic of the mother vein, in connection with magnesian or chloritic rocks, occurs nowhere so far as I have observed in this vein when it is inclosed in argillites or syenites.

Of sulphides occurring in the mother lode there are two classes which deserve special mention, beside the ordinarily occurring pyrites of iron and copper.

These are the (1) antimonial copper sulphides, and the (2) antimonial lead sulphides; both are arsenical and are rich in both gold and silver.

To the first class allusion has already been made in the former part of this paper. Besides the Rawhide Mine, they are found in most of the openings on Whisky Hill, in Tuolumne County, in the Silver, App and Josephine, and Pine Tree Mines. The lively stains of blue malachite, seen at Williams' Mine, on Whisky Hill, and occasionally elsewhere, are derived from atmospheric decomposition of the antimonial copper sulphides. The blowpipe detects the presence of iron, antimony, arsenic, copper, sulphur, tellurium (in certain cases) sulphur, gold and silver. The vein is so abundant as to give to the raw ore, in some cases, magnetic properties; and the button from the blowpipe assay becomes strongly magnetic.

The antimonial lead sulphides occur in considerable abundance at the Trio Claims, on Whisky Hill. The appearance of this ore recalls that of granular galena. The gold and silver value of this ore is very high, but no portion of it can be saved by the ordinary mechanical treatment with mercury. The blowpipe detects the presence of antimony, lead, iron, arsenic, sulphur, gold and silver. There is no trace of copper, and the quantity of arsenic present is slight. The ore is therefore essentially an antimonial lead sulphide, rich in gold and silver.

There is good reason to believe, that as this remarkable vein becomes more thoroughly explored, it will disclose other new or rare compounds containing gold, and that these already noticed will be found to be more widely diffused when proper care is applied to the study of the mineralogy of the lode.

In Amador County the mother lode is found in connection with argillaceous slates and syenite. Thus at the Eureka Mine, of Hayward, known as the Amador Mining Co., the vein has a soft, black slate for its foot wall and a heavy, firm syenite or greenstone (called *granite* by the miners) for the hanging wall. The mineralogy of the vein is extremely simple, being in fact nothing more than iron and copper sulphurets, chiefly the former, with rarely galena or blende. I sought in vain for any of the species mentioned in the former part of this paper. There are no magnesian minerals, and the *Mariposite* is entirely absent. The other mines of that range, as far as I examined them, all partake of the same simplicity in mineralogical character. There can be but little doubt, as it appears to me, that the inclosing rocks in each case exercise an important influence on the mineral contents of the vein.

SAN FRANCISCO, December 2d, 1867.

Mr. Stearns read the following:

## List of Shells collected at Bodega Bay, California, June, 1867.

BY ROBERT E. C. STEARNS.

In pursuance of the idea mentioned in my paper on the shells of Baulines Bay, of examining the bays and coast to the north of San Francisco, I made a brief trip to Bodega Bay in company with my friend Dr. Newcomb, on the thirteenth of June, 1867. Most of the species enumerated were collected within a very limited area, between tide marks, at the extreme point of Bodega Head, as the arm of land is called, which extending in a southerly direction from the general line of the coast, incloses what is known as Bodega Bay. The bay itself is, for the greater part, left bare at low tide, and the flats then exposed, composed of sandy mud, contain abundance of the common bivalves of the coast, principally *Macoma*, (two species) and *Tapes*, in all its varieties: *Saxidomus gracilis* may also be found here in considerable quantities, and is at certain seasons dug by the Indians, together with the other so called "clams." At the spot where the principal portion of this collection was made, the outcropping rock is a coarse granite, upon which *Litorina planaxis* is found in great numbers. The limited time at my disposal, at the season when the trip was made, was only sufficient to admit of a brief, and therefore unsatisfactory reconnoissance; nevertheless, at least seventeen species were detected which have not heretofore been found (or reported) so far to the north. Many of these species I failed to find at Baulines, and some of them have not been reported north of the Bay of Monterey. At Baulines, the rocks are principally shales, and contain many species of pholads, which as will be seen by a glance at this list, if not entirely absent, must be rare at Bodega; the various "nestlers" which are found associated with the borers are also wanting; *Haliotis rufescens* is abundant upon the rocky islets off the coast, but not even a fragment of *H. Cracherodii* was met with.

1. Cryptomya Californica, Conr.
2. Schizothærus Nuttalli, Conr.
3. Entodesma saxicola, Baird.
4. Mytilimeria Nuttalli, Conr.
5. Machæra patula, Dixon.
6. Macoma secta, Conr.*
7. —— nasuta, Conr.
8. Tellina Bodegensis, Hds.
9. Tapes staminea, Conr.‡
10. —— —— var. Petitii, Desh.‡
11. —— —— var. ruderata, Desh.‡
12. —— —— var. diversa, Sby.‡
13. Saxidomus gracilis, Gould.*
14. Chama exogyra, Conr.*
15. Cardium corbis, Mart.
16. Lazaria sub-quadrata, Cpr.
17. Kellia Laperousii, Desh.
18. Lasea rubra, Mont.
19. Mytilus Californianus, Conr.
20. —— edulis, Linn.
21. Modiola fornicata, Cpr.*
22. —— recta, Conr.*
23. Axinæa subobsoleta, Cpr.
24. Pecten hastatus, Sby.
25. Hinnites giganteus, Gray.
26. Placunanomia machrochisma, Desh.
27. Helix Nickliniana, Lea.
28. —— Columbiana, Lea.

29. Cryptochiton Stelleri, Midd.
30. Tonicia lineata, Wood.
31. Mopalia Wossuessenskii, Midd.
32. —— Merckii, Midd.
33. Kennerlyi var. Swanii, Cpr.
34. Trachydermon fallax, Cpr. (Mss.)
35. Nacella instabilis, Gould.
36. Acmæa patina, Esch.
37. —— pelta, Esch.
28. —— persona, Esch.
39. —— scabra, Nutt.*
40. —— spectrum, Nutt.
41. Scurria mitra, Esch.
42. Rowellia radiata, Cp.*
43. Glyphis aspera, Esch.
44. Clypidella callomarginata, Cpr.*
45. —— bimaculata, Dall, (Mss.)*
46. Haliotis rufescens, Swains.*
47. Leptothyra sanguinea, Cpr.
48. Chlorostoma funebrale, A. Ad.
49. —— brunneum, Phil.
50. Calliostoma costatum, Mart.
51. —— annulatum, Mart.
52. Phorcus pulligo, Mart.
53. Margarita pupilla, Gould.
54. —— acuticostata, Cpr.*
55. Crepidula adunca, Sby.
56. Hipponyx cranioides, Cpr.
57. —— antiquatus, Linn.*
58. Bivonia compacta, Cpr.
59. Bittium filosum, Gould.
60. Littorina planaxis, Nutt.
61. —— scutulata, Gould.
62. Lacuna porrecta, Cpr.
63. Trivia Californiana, Gray.*
64. Erato vitellina, Hds.*
65. Drillia incisa, Cpr.
66. Mangelia levidensis, Cpr.†
67. Odostomia gravida, Gould.*
68. Scalaria subcoronata, Cpr.*
69. Opalia borealis, Gould.
70. Velutina lævigata, Linn.
71. Lunatia Lewisii, Gould.
72. Olivella biplicata, Sby.
73. —— bœtica, Cpr.
74. —— intorta, Cpr.*
75. Nassa fossata, Gould.
76. —— mendica, Gould.
77. Amycla carinata var. Hindsii, Rve.
78 —— gausapata, Gould.
79. Amphissa corrugata, Rve.
80. Purpura crispata, Chem.
81. —— canaliculata, Duel.
82. —— saxicola var. ostrina, Gld.
83. Ocinebra lurida, Midd.
84. —— —— var. aspera, Baird.
85. —— interfossa, Cpr.
86. —— —— var. atropurpurea, Cpr.
87. Cerostoma foliatum, Gmel.

---

*The species marked with an asterisk, seventeen in number, have never before been reported from a locality so far north.

† Mangelia levidensis (teste J. G. Cooper) has not previously been detected at a point so far south; it has heretofore been credited to "Straits of Fuca, W. T." *vide* Geo. Survey Cat. 1867, by J. G. C.

‡ Tapes staminea and vars. were obtained at low water by digging from twelve to twenty inches deep, and together with Macoma secta and M. nasuta, were found in the same holes.

The Chitons above enumerated, have been compared with specimens recently (March, 1868) received labeled, from Dr. Carpenter of Montreal.

No. 39, Acmæa scabra; elevated dark colored specimens of this species with the characteristic sculpture sharply and well defined, were obtained in considerable numbers. Subsequently at Monterey I found occasional specimens displaying nearly the same elevation and of the same color as those from Bodega.

## Shells collected by the U. S. Coast Survey Expedition to Alaska, in the year 1867.

BY ROBERT E. C. STEARNS.

George Davidson, Esq., connected with the Coast Survey service of the United States, who commanded the scientific department of the Alaska Expedition, very kindly tendered positions on his staff to the following members of the Academy: Dr. A. Kellogg, as Surgeon and Botanist; Theodore A. Blake, as Geologist; and W. G. W. Harford, as General Collector, by whom the species here enumerated were collected. My acknowledgments are due to Dr. J. G. Cooper, of San Francisco, for assistance in determining species; also to Dr. William Stimpson of Chicago, for similar service in reference to the Buccinidæ.

1. Saxicava pholadis, Linn, var. arctica; Sitka, Bella Bella, Kodiak, Ounalaska.
2. Mya arenaria, Linn.; Kodiak.
3. Schizothærus Nuttalli, Conr.; Sitka, Kodiak.
4. Machæra patula, Dixon; Kodiak, Ounalaska.
5. Macoma nasuta, Conr.; Kodiak.
6. Macoma inquinata, Desh.; Fort Simpson, Bella Bella, Kodiak, Spruce Isl.
7. Macoma inconspicua, Br. & Sby.; Fort Simpson, Chilchat, Kodiak, Spruce Isl.
8. Mera salmonea, Cpr.; Kodiak.
9. Standella planulata, Conr.; Kodiak, Ounalaska.
10. Tapes staminea, var. Petitii, Desh.; Fort Simpson, Chatham Sound.
11. Tapes staminea, var ruderata, Desh.; Fort Simpson, Carter's Bay, Sitka, Bella Bella, Kodiak, Spruce Isl. Ounalaska.
12. Saxidomus Nuttalli, Conr.; Ft. Simpson, Sitka, Carter's Bay, Kodiak.
13. Cardium corbis, Mart.; Sitka, Bella Bella, Carter's Bay, Kodiak.
14. Cardium blandum, Gould; Sitka, Kodiak, Ounalaska.
15. Serripes Grœnlandicus, Chem.; Kodiak, Ounalaska.
16. Kellia Laperousii, Desh.; Ounalaska.
17. Lasea rubra, Mont.; Sitka.
18. Mytilus edulis, Linn.; Ft. Simpson, Carter's Bay, Bella Bella, Sitka, Kodiak, Spruce Isl.
19. Modiola modiolus, Linn.; Sitka, Ounalaska.
20. Modiolaria lævigata, Gray; Ounalaska.
21. Axinæa septentrionalis, Midd.; Bella Bella.
22. Yoldia, n. s.?; Stomach of Halibut, Kodiak.
23. Acila castrensis, Hinds; Sitka.
24. Placunanomia macroschisma, Desh.; Kodiak, Ounalaska.
25. Helix Columbiana, Lea.; Sitka, Chilchat River, 59° 9′ N.
26. Helix Vancouverensis, Lea.; Sitka, V. Island.
27. Helix ruderata, Stud.; Ounalaska.
28. Helix fulva, Drap.; Sitka, Ounalaska.
29. Vitrina pellucida, Mull.?; Ounalaska.
30. Zua lubrica, Mull.; Sitka, Kodiak.
31. Siphonaria thersites, Cpr.; Fort Simpson.
32. Katherina tunicata, Wood; Sitka.
33. Tonicia lineata, Wood; Fort Simpson.

34. Tonicia submarmorea, Midd.; Fort Simpson.
35. Mopalia muscosa, Gould; Vancouver Island.
36. Mopalia Wossnessenskii, Midd.; Fort Simpson.
37. Mopalia Merckii, Midd.; Fort Simpson.
38. Acmæa patina, Esch.; Fort Simpson, Kodiak, Ounalaska, Sitka.
39. Acmæa pelta, Esch.; Sitka, Kodiak, Ounalaska.
40. Scurria mitra, Esch.; Sitka.
41. Glyphis aspera, Esch.; Sitka.
42. Haliotis Kamschatkana, Jonas; Sitka.
43. Calliostoma costatum, Mart.; Sitka.
44. Margarita pupilla, Gould; Ft. Simpson, Bella Bella, Sitka, Ounalaska.
45. Margarita helicina, Mont.; Ounalaska.
46. Phorcus pulligo, Mart.; Sitka.
47. Crepidula navicelloides, Nutt.; Bella Bella.
48. Crepidula grandis, Midd.; Captain's Harbor, Kodiak, Ounalaska.
49. Bittium filosum, Gould; Ft. Simpson, Carter's Bay, Bella Bella, Sitka.
50. Littorina scutulata, Gould; Sitka.
51. Littorina Sitkana, Phil.; Chatham S'nd, Carter's Bay, Bella Bella, Sitka, Kodiak.
52. Lacuna solidula, Loven.; Ounalaska.
53. Isapis fenestrata, Cpr.; Ounalaska.
54. Trichotropis cancellata, Hds.; Fort Simpson, Sitka.
55. Natica clausa, Brod. & Sby.; Ft. Simpson, Kodiak, Ounalaska.
56. Lunatia pallida, Brod. & Sby.; Captain's Harbor, Ounalaska.
57. Priene Oregonensis, Redf.; Ounalaska.
58. Olivella bætica, Cpr.; Sitka.
59. Nassa mendica, Gould; Sitka.
60. Amycla gausapata, Gould; Ft. Simpson.
61. Amphissa corrugata, Rve.; Ft. Simpson, Carter's Bay.
62. Purpura crispata, Chem.; Fort Simpson, Bella Bella, Lawson's Harbor, Carter's Bay, Sitka.
63. Purpura canaliculata, Ducl.; Chatham Sound, Carter's Bay, Bella Bella, Sitka, Kodiak, Spruce Isl., Ounalaska.
64. Purpura saxicola, Val.; Ounalaska.
65. Purpura saxicola var. fuscata, Fbs.; Fort Simpson, Carter's Bay, Bella Bella, Sitka.
66. Ocinebra interfossa, Cpr.; Carter's Bay, Bella Bella, Sitka.
67. Cerastoma foliatum, Gmel.; Bella Bella, Sitka.
68. Trophon multicostatus, Esch.; Ounalaska.
69. Trophon orpheus, Gould; Sitka.
70. Chrysodomus dirus, Rve.; Chatham Sound, Ft. Simpson, Carter's Bay, Bella Bella, Sitka.
71. Chrysodomus liratus, Mart.; Chilchat, Kodiak, Ounalaska.
72. Buccinum glaciale, Linn.; Ounalaska.
73. Buccinum polare, Gray; Captain's Harbor, Ounalaska.
74. [*]Buccinum cyaneum, Brug.; Kodiak.
75. Volutharpa ampullacea, Midd.; Fort Simpson, Bella Bella, Sitka, Kodiak, Ounalaska.

---

[*] In a note from Dr. Stimpson, he remarks in reference to this species: it "has not, as far as I am aware, as yet been reported from the Pacific."

Mr. Bolander presented a paper by Mr. Lesquereux, entitled "A Catalogue of the species of Mosses found up to the present time on the Northwest coast of the United States of America, and especially in California," which was referred to the Publication Committee and ordered printed in the Memoirs of the Academy.

Professor Whitney exhibited several of the maps in preparation at the office of the State Geological Survey, and gave a somewhat detailed account of the operation of the survey during the year 1866 and 1867, and of the progress in the publication department of that work. The statement made was in the main identical with that contained in the biennial letter of the State Geologist to the Governor, published by order of the Legislature then in session.

Dr. H. Gibbons exhibited a piece of pork erroneously supposed to contain trichinæ; he believed the entozoa in question were really *Cysticerci*. They have the appearance of soaked peas, and are not injurious when cooked.

Mr. R. L. Harris mentioned the fact that the railroad surveys conducted by himself, for connecting Vallejo and Sacramento, indicated that the latter place was not so much above the sea level as had generally been assumed from barometrical observations, and he believed that the top of the present levee at Sacramento was about twenty-one feet above mean high tide at Vallejo, instead of fifty-six, as previously supposed. If this was true, then the lowlands in the vicinity of Sacramento were in fact, only about one and a half feet above the sea level. The surveys of the coming season would probably enable him to fix this important point with accuracy.

Dr. Gibbons suggested that if the tule lands in the Sacramento and San Joaquin Valleys were permitted to undergo the natural processes of growth and decay, instead of being annually burned over, the land in question might in time become sufficiently elevated to be inhabited.

Mr. Goodale, who had recently visited Russian America, exhibited a number of implements and weapons of the natives of that region, and gave an account of their use. He also remarked on some of the topographical and geological features of that country.

## Regular Meeting, December 16th, 1867.

Vice President Ransom in the Chair.

Thirty-seven members present.

The following gentlemen were elected Resident Members: Messrs. William Hamel, P. B. Cornwall, Horace D. Dunn and W. B. Rising.

Donations to the Cabinet: seven specimens of ores from Gregory Yale, Esq., also, a series of samples in bottles, illustrating the chlorination process of extracting gold from the sulphurets, by the same.

Mr. Goodyear read the following paper:

### **Salt Spring Valley and the adjacent region in Calaveras County.**

BY W. A. GOODYEAR.

Having spent some time during the past summer in Copperopolis, and the region lying west and northwest from it, I offer the following observations respecting its topography and geology. I will first notice the

#### TOPOGRAPHY.

For a general description of the topography, etc., of Calaveras County, including the main features of the region in question, reference may be made to Prof. J. D. Whitney's Report upon the Geology of California, Vol. I, p. 253. In addition, however, to what is there stated, I will say that Copperopolis lies at the *southwestern* base of Bear Mountain, the summits of which rise to an altitude of something more than 2,000 feet above the sea. The Gopher Hills, also mentioned in the report, form a well defined and connected, though subordinate range, lying to the southwest of, and nearly parallel with the general course of Bear Mountain. This range forms a prominent feature in the topography of the region for a distance of at least fifteen or eighteen miles southeasterly from the Calaveras river. Its summits are probably 1,400 feet above the sea, and the lowest break or gap within the distance named is that through which Rock Creek finds its way to the plains below. The valley or depression between the Gopher Hills and Bear Mountain, whose average width is four to six miles, has received the name of Salt Spring Valley. Its general altitude is little less than 1,000 feet above the sea, that of the town of Copperopolis being nine hundred feet according to H. P. Handy's survey of a railroad route from Copperopolis to Stockton. I should mention that for several miles northwesterly from Copperopolis, Bear Mountain has an outlier along its southwestern base, in the form of a low but tolerably well marked hilly ridge, between which and the base of the mountain is a narrow but continuous valley; and it is in this valley that the copper-bearing belt of Copperopolis is found. Southwest of this outlier, and for a distance of three or four miles northwesterly from Copperopolis, Salt Spring Valley consists mainly of a region of low hills, traversed by a net-work of steep and narrow gulches. Farther northwest the surface of the valley for three or four miles is more uniform, and here we find the nearly level area of "Tower's Ranch," and the gently sloping basin of the "Salt Spring Valley reservoir." Beyond this, the country is again hilly to the Calaveras river. Southeast and south of Copperopolis, the surface is everywhere hilly. The slope of the Gopher Hills towards the southwest is rapid until we reach the low rolling country which forms the border of the San Joaquin Valley.

Black Creek débouches from Bear Mountain a mile or so southeast of Copperopolis, and flows to the Stanislaus. Littlejohn's Creek takes its rise in the hilly regions of the valley west of Copperopolis, and flowing southwesterly, finds its way through the hills into Rock Creek. The latter rises in Bear Mountain, five or six miles northwesterly from Copperopolis, and flowing southwest across Salt Spring Valley, breaks through the Gopher Hills, and continues its course through the lower country to French Camp Slough, a branch of the San Joaquin. All these creeks become dry in the summer, though in winter they often carry very large volumes of water. At the point where Rock Creek breaks through the Gopher Hills is the substantial dam of the Salt Spring Valley Reservoir.

## GEOLOGY.

The strike and dip of the rocks are more or less variable; but, so far as my observations extend in the region described, they have everywhere the same general northwesterly trend and high northeasterly dip which characterize so large a portion of the gold-bearing slates of central California. The strike is usually from N. 50° W. to N. 70° W., (magnetic) and the dip from 50° northeast to vertical. I have seen no case here of a decided southwesterly dip, nor of a low one to the northeast. It is somewhat remarkable, by the way, that this high northeasterly dip should be so general as it is in the great mass of auriferous slates which forms the southwestern flank of the Sierra Nevada. It is *towards* the granite axis of the chain, instead of *from* it, as would seem more natural. The causes of this are by no means as yet fully explained. It is a circumstance, however, which would lose none of its interest in the future, if, as certain facts mentioned in the Geological Report, Vol. I, p. 286, might possibly seem to indicate, further explorations should prove it to be in general a great inversion of the strata—their upper portions having been "forced back by immense pressure from above, producing a condition of things similar to that so often observed in the Alps, which is known as the 'fan structure,' and has so much perplexed geologists." When we take into account the enormous denudation, amounting to thousands of feet in perpendicular depth, which is known to have taken place in the Sierras within the most recent geological periods, and the whole of which, in this case, must also have belonged to the inverted portion of the strata—unless indeed the inversion were produced by a peculiar sliding and bending of the strata by their own weight, the upper flexure having been since entirely removed—and when, in addition to this we consider the hundreds of miles in length, and the great thickness of the strata in question, we can perhaps begin to appreciate the magnitude of the movements and forces which would be involved in producing such an effect. It would indeed, if true, be a striking illustration of the grandeur of the scale upon which many of the physical features of this country have been cast, as compared with those of other and better known regions. But it is hardly worth while to speculate further upon probabilities like this in the present state of our knowledge, and I return to my subject.

In Salt Spring Valley, the rocks consist almost entirely of slates, with little variety of character, generally thin-bedded, fine-grained and argillaceous, sometimes magnesian or chloritic, and often splitting with facility into very thin sheets. The thinnest bedded varieties are usually fragile, and the structure is often wavy ; but sometimes the cleavage is regular and thin enough, and the rock possesses sufficient strength to furnish a tolerable material for roofing purposes ; although no attempts have been made, so far as I know, to thus apply it ;—and, in fact, the expense attendant upon its excavation and transportation would preclude any extensive use of it, even if its quality were unsurpassed, which it is not.

The earthy covering of the rocks throughout the valley is usually very shallow and the soil poor, (Tower's ranch is, however, an exception) and in many places the thin sharp edges of the slates project in such a way as to form an exceedingly jagged surface, though the projections are low, generally not exceeding two or three feet in height. Much of the surface is strewn with float quartz, usually in the shape of small but partially rounded pebbles. Quartz veins of small or moderate size, parallel with the stratification, are not uncommon. Iron pyrites is of frequent occurrence, with a little gold in the quartz. Some of the veins have been more or less worked, but none of them to any great extent. About three or four miles westerly from Copperopolis, in the hilly portion of the valley, is a ten-stamp quartz mill, and a short distance from this, on Littlejohn's Creek, is the site of an older one, which was burned down. Neither of these mills ever yielded much profit, so far as I can learn, nor does the present one seem likely to do so.

Several of the gulches in this vicinity are said to have yielded gold enough in the past to pay for working, although the diggings were not rich or extensive. It is stated also that some years since, in one of these gulches, a quartz boulder was found, weighing about one hundred pounds, which yielded between two and three thousand dollars' worth of gold. There are three or four quartz veins near here, from which more or less rock has been crushed. Portions of the rock from one of these veins, the Winnemucca, a prettily-shaped vein of three to four feet in thickness, are very cellular in structure, and some of it shows fine gold quite freely to the naked eye. The metal however, must be very irregular in its distribution, or the ore would have paid better in the mill than the three or four dollars per ton which I am told it yielded; and in fact, the general character of the float quartz of the region, when taken in connection with the probable origin of the valley itself, and the fact that no important placer "diggings" have been found here, does not seem to favor the probability that these quartz veins will ever prove of much value. Between the present mill and the site of the old one, as well as certain other localities in the valley, are springs containing various alkaline salts, from which the name "Salt Spring Valley" is derived.

Accompanying the copper formation of Copperopolis, and just west of it, is an immense body of serpentine, lying parallel with the general stratification of the slates, and traceable for miles along the valley by the openings made in it in the workings for copper. Opposite a point 1,000 or 1,200 feet northwest of the upper shaft of the Keystone claim, but on the southwest flank of the outlier of Bear Mountain, already noticed, is another heavy mass of serpentine. How far this extends in a northwest and a southeast direction I do not know, as I have not followed its line of outcrop, but it is certainly not less than 1,000 feet in length.

The lithological character of the Gopher Hills is entirely different from that of Salt Spring Valley. They consist mainly of a pretty hard and tough, more or less coarsely crystalline, and dark-colored hornblendic or pyroxenic rock, which is evidently metamorphic, probably of a grit or sandstone. Epidote is not uncommon in this rock, and calcite is occasionally found. though rare. Through most of this region the original stratification has been largely obscured, or nearly obliterated. Its general course, however, can still be traced without difficulty in the more or less elongated and flattened form, and the general trend which the rocky outcrops frequently assume when viewed from a little distance.

The texture of the rock varies considerably. In general it is rather coarsely crystalline; but not unfrequently it is much finer, or even compact; sometimes it is jointed. At one locality, in particular, ("Goodwin's," or "Sheep Ranch" Gulch) I noticed this jointed structure so well developed that a compact and very tough, almost imperishable rock could be quarried with facility, if desired. in nearly rectangular blocks and slabs.

It is not uncommon to find among these hills those peculiar holes in the rock which were hollowed out and used by the Indians as mortars in which to grind their food. I observed a number of similar holes in the hard rock, precisely in the bed of Rock Creek, in the ravine a short distance below the dam of the Salt Spring Valley Reservoir. It may be a question here, whether they owe their origin to the Indians or to the action of the stream, though from the peculiar deep and narrow form, I am inclined to ascribe them to the former. Heavy masses of flinty rock or hornstone also occur, particularly upon the southwest flanks of the range. This rock usually exhibits a much more distinct bedding than the ordinary mass of the hills. Its stratification is often perfectly regular, and sometimes the layers are beautifully thin and delicate. There is a very heavy outcrop of this finely banded rock in the ravine a short distance below the dam at Rock Creek. Higher up the hill, upon the road known as "Black's

Grade," another outcrop of the same formation has been cut across in building the road, and here a portion of the same flinty rock is thickly filled with *fossils*, which appear to belong either to some species of crinoids or fucoids, though the structure is too much obliterated, and the specimens too much distorted to admit of definite recognition. They are apparently flattened in a direction parallel with the banding of the rock. From the general mode of occurrence of this hornstone, and from the frequent sharp and distinct lines of demarcation between it and the adjacent hornblendic rock, it might be inferred that the former traversed the latter as veins, and the delicate banding of the rock, although parallel to the general stratification of the country, would not preclude such an assumption. But the fossils speak decidedly against it, and it is probable that the hornstone is a metamorphic form of fine sedimentary deposits, and that the banding is the result of the original stratification. Quartz veins occur here occcasionally, and some of them at least are auriferous, though I know of none having been worked with profit hitherto. It is not improbable, however, that some of them may be found remunerative in the future, since many of the gulches among the hills here, in the early days of mining, were rich in placer gold. The degree of metamorphism throughout these hills has been very high; but I have seen no evidence of any direct igneous action—at least no rock that I could identify as eruptive, with the single exception, perhaps, of a small and apparently completely isolated body of well characterized *granite*, which occurs near the base of the Gopher Range, and between its highly metamorphosed rocks and the San Joaquin Valley, which is overlaid with tertiary and other recent formations. The occurrence of this patch of granite here, isolated as it seems from any other similar rock, is certainly a point of much interest; but I have not been able to study its relations. Its stratigraphical and topographical position is similar to that of the Folsom granite, and it may be connected with it in origin. If it should hereafter appear that that there is a well characterized, though more or less interrupted line of granitic outcrops traceable throughout central California, along the lower foothills of the mountains, and *west* of the great belt of auriferous slates, it would have a most important bearing upon the theory of the general structure of the Sierra Nevada. The existence of such a line, indeed, might point to a very different, and perhaps more probable, *modus operandi* than that already suggested, by which the auriferous slates themselves may have reached their present position, and received their easterly dip.

One of the most interesting points connected with the geology of the Gopher Hills, is the auriferous belt in which occurs the "Quail Hill" Mine, and of which I shall speak further presently.

Of the geology of Bear Mountain I know but little, having crossed it by but a single route. Where I have seen it, however, it consists largely of a similar rock to that which forms the mass of the Gopher Hills. Chromic iron is said to occur in considerable quantity at a certain locality in Bear Mountain, the exact whereabouts of which I could not learn. The slates of the valley extend, in general, completely up to the base of the Gopher and Bear Mountain ranges on either side, and sometimes a short distance up their flanks; but here the transition to the harder crystalline rock is usually quick and well marked.

Salt Spring Valley probably owes its existence, as such, entirely to inequality of denudation; the comparatively friable slates yielding much more readily to mechanical action than the harder and more highly metamorphosed rock on either side, which has thus been left in the form of mountain ridges, projecting many hundreds of feet above the adjacent region, while the intervening and surrounding rock has been swept away to the plains below,

A partial description of the copper mines of Copperopolis will be found in the "Geology of California," Vol. I, pp. 254–257. The depth of the main shaft in the "Union" is now stated to be a little over five hundred feet, and the greatest depth reached in the "Keystone," is said to be five hundred and sixty feet. All the deposits of ore here worked lie parallel with the strike and dip of the inclosing strata. The great ore mass of the "Union" Mine forks or divides into two branches towards the northwest; and at the lowest depth now reached, its width or thickness, after having reached a maximum, is again diminishing. In the "Keystone" Mine there have been two separate and nearly parallel bodies of ore worked to a considerable extent, and a third one was struck last spring previous to the suspension of work in the mine. The two main bodies of ore in this mine have "pinched out" or disappeared in various directions in their lines of strike and dip. They seem to have an irregular lenticular form, and together with the great mass of the "Union" appear to lie in what are called "shoots," which pitch at an angle of 50° or 60° in the direction of the strike towards the northwest. The northwesterly prolongation of the strike of the great "Union" deposit does not coincide with either of the "Keystone" deposits, but passes east of them. There have been other and smaller deposits in the "Union" ground, more or less worked, lying west of the main body, some of which may possibly connect with the "Keystone" shoots, though the best information I could obtain leads me to think otherwise, and that they were probably isolated lenticular masses. The mass of the great deposit in the "Union" Mine consists of an intimate mixture of chalcopyrite and iron pyrites, containing on an average sixteen to seventeen per cent. of copper. Well defined selvages are not to be seen at Copperopolis, and the country rock is impregnated in all directions, sometimes to a considerable distance from the purer ore, with more or less finely disseminated copper and iron pyrites. In Europe it would pay to crush and work much of the wall rock itself for the copper which it contains; but here it is entirely worthless, as even ten to twelve per cent. ore is not worth mining and shipping at present prices.

It will be seen that the more recent and deeper developements in the Copperopolis mines have only served to confirm the opinion expressed two years ago by the State Geologist (Geol. Vol. I, p. 225) that "the deposits of copper ore in this region, like nearly all the others in California, do not appear to be included in regular fissure veins, but rather to form *independent masses* [the italics are mine] lying in the direction of the strike of the inclosing rocks, and dipping with them." It seems, further, that they are here arranged in some sort *en échelon*. There is no evidence whatever of the existence here of a regular and continuous vein of copper ore, stretching for miles through the country, as some have supposed. (See Ross Browne's Report, p. 144.)

The finding of "copper indications," *i.e.*, of small and isolated bodies of ore, distributed with some constancy through a narrow belt of country, for no matter how many miles in length, is anything but conclusive evidence of the existence beneath of a *regular vein* of corresponding length (which, by the way, if it existed, would be an anomaly in the mining world)—especially when all the developments of the most extensive workings hitherto made point so decidedly and strongly to the opinion that there is no *true vein* at all. Such "indications" are however evidences, so far as they go (and they go a good way in this direction) of the probable existence of other large bodies of ore distributed here and there along the belt in question. It is not improbable that such may be found in the future, and it would not be strange even if some of them should surpass in magnitude and value the great deposit of the "Union," which has already yielded such enormous quantities of copper, and is yet far from being worked out.

A description of the auriferous deposit of Quail Hill, in the Gopher Range, together with a similar one at Whisky Hill (called also the "Harpending Mine") in Placer County, by Prof. B. Silliman, was read before the California Academy of Natural Sciences, at their meeting of April 15th, 1867, and will be found in their published "Proceedings," Vol. III, pp. 349–351. This paper describes well the particular deposits in question, as well as the general appearance and character of the formation in which they occur. Such deposits, however, are not confined to one or two localities; but there are other points in Calaveras County at which gold is known to exist in considerable quantity, and with similar mode of occurrence. Among these I may mention Quail Hill No. 2, near the Napoleon Copper Mine, two or three miles southeast of Quail Hill No. 1, and the "Plymouth Rock," or "Austin and Hathaway" claim, at Rich Gulch, near the Calaveras River. Moreover, the geological causes and the peculiar chemical decomposition of the rock, which have been involved in the formation of the deposits in question, are by no means confined to the localities where gold is known to occur. On the contrary, they may be traced with considerable constancy through a narrow belt of country along the southwest flank of the Gopher Hills, and stretching from the Calaveras River southeast for a distance of at least fifteen miles, and perhaps farther. Towards the northwest, the same belt crosses the Calaveras; but how much farther it extends in this direction I have no present means of knowing. It is not unlikely that a similar formation may be found to exist, here and there at least, in the same general line of strike, nearly parallel with the stratification of the country, through Amador and El Dorado Counties to Placer, and perhaps beyond. The possibility of this at least is worth remembering. Throughout this belt, in the Gopher Range, surface cuts and shafts, of greater or less depth, made and sunk in prospecting for copper, are of frequent occurrence. In fact, this is the same belt that has been so often mentioned as "the second important copper-bearing belt of Calaveras County," and located some six or seven miles southwest of the main copper belt of Copperopolis. The "importance" of this belt, on account of the copper ores which it contains, has been most grossly exaggerated. An amusing illustration of this fact is to be seen in a "map of the copper mines in Calaveras County," published a few years since, which represents the whole region in question as literally covered for miles with highy colored "locations" or "copper claims," the whole of which, with few exceptions—and these due not to copper but to gold—have served no further end than that of rendering their locators and owners sadder and wiser men. At one locality, indeed, viz, the "Napoleon Mine," a body of copper ore was found which in many countries would have been remunerative, and was worked to a considerable extent; but the working here was attended only with loss, and was some time since entirely discontinued. It should be remembered, however, in speaking of the copper mines of California, that not only have they had to contend with the general ignorance of copper mining, and especially of copper metallurgy which has existed throughout the State, and with extremely high prices for labor and transportation; but also that, for a year or two past, the largely increased supply of ore from the mines of Chili in South America, and elsewhere—together with the diminished demand and consequent low price for metallic copper, reacting with increased effect upon the value of the ore—have told with crushing weight even upon the best mines. There are certainly not more than one or two, perhaps not even a single deposit of copper ore in the known world, which surpasses or equals, in magnitude and intrinsic richness combined, that of the "Union" Mine of Copperopolis; and yet it is said that even the "Union" itself, which is the only mine now active at Copperopolis, is hardly more than paying expenses at present rates. So far then as my observations extend, there is simply nothing whatever in this "second copper belt" which can for some time to come justify the expenditure of money in searching for copper here; though it is not impossible that, besides the "Napoleon" Mine, other deposits of ore may exist within the belt, which at some future time and under more favorable circumstances of labor, fuel, and transportation, may become of value for the copper which they contain.

It has been already remarked that the zone or belt of surface decomposition in which the "Quail Hill" and other similar mines occur, may be traced with considerable constancy for at least fifteen or eighteen miles, and that it is not improbable that it is much longer than this. We cannot, however, infer from our present knowledge that the decomposed or "calico" rock is continuous throughout the belt, or even for any considerable portion of its length. On the contrary, its distribution within the belt appears capricious and local, *i.e.*, it seems to occur in more or less detached and isolated masses, which vary largely in form and size, and are irregular and indefinite in outline; so that little more can be predicated of their occurrence in general, than that they are mostly confined within a comparatively narrow belt, and that their longest dimension exhibits a general tendency to approximate parallelism with the axis of the belt, and the stratification of the inclosing country. Sometimes, as for instance, along the northeastern side of the Quail Hill formation, this tendency is so strongly developed, and the passage from the decomposed to the undecomposed rock is so rapid, as to form for some little distance a tolerably straight and well defined "wall" or line of demarcation, parallel, or nearly so, with the stratification of the country. But the change or passage from the decomposed or "calico" rock to the surrounding undecomposed country, though sometimes rapid is always gradual, so far as I have seen ; and though we cannot yet speak much from underground explorations, the surface appearances throughout the country would indicate decidedly that so regular a line of demarcation as this at Quail Hill is the exception, and not the rule. The southwestern limit of the decomposed mass of Quail Hill has been fonnd at several points ; but here the change from the decomposed to the undecomposed rock is not so rapid ; and though the explorations here, being shallow and limited, are insufficient to determine this point with certainty, it is not probable that any such regularity of demarcation exists here as upon the opposite side. Most of the "calico rock" of this belt still retains distinctly the structure of the undecomposed rock from which it was formed. The crystalline hornblendic rock is thus seen to have been largely altered by the decomposing agency, and even the hornstone, which lay in its track, seems to have been more or less affected by it. The decomposition has been purely an oxidation, accompanied by such mechanical and chemical changes as filtering mineral waters might produce. It is probably superficial, both in origin and character, extending to no great depth, although the main level at Quail Hill is nearly one hundred and twenty feet beneath the summit of the hill, and the decomposition of most of the rock at this depth, so far as exploration has gone, is as perfect as at any higher level. It is certainly long subsequent in date to the metamorphism of the surrounding country, and is unquestionably largely due to the action of the products of the oxidation of metallic sulphurets (chiefly those of iron and copper) which were originally distributed through the rock. At the same time it is not easy to account for the whole of it in this way alone, since at certain localities undecomposed sulphurets are seen near the surface, and in rock which is apparently much more permeable to atmospheric influences than was much of that which has been more deeply decomposed ; and again, much of the decomposed rock, though retaining well its original structure, shows far too little traces of sulphurets to readily account for so general and thorough a decomposition as has taken place. It is all indeed more or less colored by oxide of iron, but much of it is not deeply colored, and the undecomposed hornblendic rock itself, in the absence of all sulphurets, contains sufficient iron in the state of protoxide to impart a strong coloring when the rock is decomposed and the iron passes to the state of sesquioxide. Much of the iron originally present has undoubtedly been removed in a soluble form, as sulphate, etc. But in rock which preserves its original structure, as well as most of this does, pyrites, if originally present, would have left traces of its existence in the form of casts or cavities in the deomposed mass, which might or might not have been filled with ferric oxide or other matter. In certain localities the decomposed rock is in fact filled with such cavities, often cubical in form, attesting the former presence of large quantities of disseminated sulphurets. But in other localities they are few and far between, and here accordingly the decomposition can hardly be supposed to have been due to the local presence of sulphurets alone.

The exact methods by which the general and local decomposition has been effected, and those by which the rock was originally impregnated with metallic ores—as well as the manner in which certain substances, as barytes, now found as sulphate, and true porphyry, now found as kaoline or lithomarge, have found their present situation in the belt in question—all these would possess both interest and importance in a high degree, could they be more definitely known. Such questions, however, cannot be answered with certainty, and their discussion here would lead us too far into the doubtful realm of chemical geology.

But whatever may have been the agencies at work, it is evident that there is nothing in all this to remind us of a true vein formation. It appears that the zone in question is neither a vein, nor generally speaking a system of veins. On the other hand, it possesses emphatically in general the characteristics of what the Germans style an impregnation—an impregnation indeed which exhibits a certain regularity as being mostly confined within a narrow zone, and stretching through a considerable extent of country, but which within these limits shows the greatest irregularity of form, and much variety of character. Veins of quartz occur here and there within the belt; but they are not more frequent here than elsewhere, and their occurrence has probably little or no direct connection with the peculiar character of the belt itself. There is very little that deserves the name of quartz at Quail Hill, though much of the surface rock is pretty highly silicious in character.

The impregnation of the rock with metallic sulphurets, particularly with sulphurets containing copper, has in certain localities been sufficiently powerful and concentrated to assume, in greater or less degree, the characteristics of segregated veins of limited extent. This has been the case at the Napoleon mine, and also at Quail Hill, where there is, or was, a band of oxidized ores of copper traversing the decomposed rock in a direction parallel with the general stratification. This band consisted chiefly of the green and blue carbonates of copper, mingled with ferruginous and earthy matter, and accompanied by barytes. The last named mineral, so common a veinstone in other parts of the world, but hitherto so rare in California, occurs here in considerable quantity. Its form is granular compact, sometimes quite pure, but usually contaminated and intermingled with other matters. Crystallized specimens of it have not been found here to my knowledge. It is hardly probable that the barytes itself contains either gold or silver; yet it certainly occurs here in the most intimate contact with both, as I have seen respectable particles of gold in place upon the immediate surface of compact specimens of barytes—and a sample of heavy concentrated barytic sand from the tailings of the mill, of sufficient fineness to pass through a sieve of one hundred holes to the linear inch, yielded to the assay over eleven dollars per ton in gold and silver.

The thickness of the copper band varied from one to three or four feet. Its outlines were indefinite, and its original characteristics of form, etc., much obscured by the complete decomposition both of itself and the surrounding rock. It was without doubt originally a segregated mass of sulphurets; and though it seems now to have nearly or quite run out and disappeared, it may be found to come in again as such, in depth, unaltered below the line of surface decomposition.

Other bands of similar character may perhaps exist in the yet undeveloped portions of the mine. But the great mass of decomposed material which forms Quail Hill as a whole, retaining as it does to so great an extent the original structure of the country rock from which it was formed, can in no proper sense be called a vein; although its extent, when considered as a repository of the precious metals, is something far transcending the size of ordinary veins.

The gold and silver of these formations which have recently attracted so much attention, and have become the object of extensive mining operations at Quail Hill, seem to be distributed at the latter place, to a greater or less extent, throughout the whole mass of the decomposed rock. The surface earth of the hill, also, everywhere contains gold, which may be discovered by washing it in the pan; but this ceases to be the case on the hillsides as soon as the limits of the decomposed rock are passed. Some of the gold, as stated by Prof. Silliman in his communication to the California Academy, already referred to, is quite coarse; but much of it is exceedingly fine and difficult to save in the mill. It is a noticeable fact in the distribution of the precious metals at Quail Hill, that the cupreous ores and the material in their vicinity have hitherto been found to be always rich in gold and silver, and to contain chiefly, if not exclusively, the coarsest gold.

The distribution of the gold at Quail Hill is not uniform, the more slaty and ferruginous portion of the decomposed rock being generally the richest in ore, while the compact porphyritic kaoline contains but traces of gold, if any, and some of the other and more compact rock is comparatively poor. The original distribution of the sulphurets here seems also to have followed approximately the same law — the kaoline containing in general but little trace of their existence, while the more slaty rock is often full of their cavities. Hematite, as well as the hydrated sesquioxide of iron, occurs here in small quantities; and a curious point in this connection is the fact that, while much of the best ore is very highly charged with the hydrated sesquioxide, the hematite has been found hitherto to contain little or no gold. The origin of the decomposed porphyry at Quail Hill is a point of much interest, and it may be a question whether it is not the remnant of an intrusive igneous dyke. The arguments in favor of this supposition consist in the entire dissimilarity in character and structure between it and the surrounding material, as well as in the rarity of porphyry in the region round about. In fact, I have nowhere else in this portion of the country seen anything deserving of the name, while the whole texture and appearance of this mass at Quail Hill are precisely such as would have resulted from the decomposition in place of a true feldspathic porphyry. But however strongly these facts may seem to argue in favor of an igneous origin, it is not easy to reconcile such a supposition with its mode of occurrence here. Other masses of similar character may exist within the hill; but so far as existing developments have cut or uncovered the one of which I speak, the indications are that it is irregular in outline, quite limited in extent, and of approximate lenticular shape. Moreover, in certain places, it seems to pass gradually into the eastern country rock, without any distinct line of demarcation, the change in the texture of the rock being even more gradual than the passage from the decomposed to undecomposed material. At certain points, but a few feet from the eastern "wall," the kaoline is as perfectly porphyritic in its texture and appearance as in any portion of the mass, while between the two is every grade of passage from the one to the other —the country rock being neither distinctly porphyritic in texture, nor chiefly feldspathic in composition. I am strongly inclined to think, therefore, in spite of its peculiar and distinctive character, that this porphyritic mass is but a local result of the metamorphism of sedimentary strata, which, in many portions of this region, seems to have been as varied in character as it has been high in degree.

The degradation of such formations as this at Quail Hill, has undoubtedly furnished some of the placer gold of the region; but the evidence does not by any means justify us in supposing that it has furnished the whole of it. Gopher Gulch, which runs at the foot of Quail Hill, and its branches, for a mile above this point, or nearly to the summit of the Gopher Range, and hundreds of feet above the level of the Quail Hill formation, were in early days rich in placer gold, much of which was very coarse. Other gulches in the vicinity have also furnished more or less gold high up towards the summit of the range. Moreover, the quartz veins, which here and there occur in the hard metamorphic rock, are known, some of them at least, to contain gold, and such have probably played their part in the formation of the placers.

I have already mentioned the fact of the prominent association of the precious metals with ores of copper at the Quail Hill mine; but this fact derives still further interest from what follows. As far as my observations have extended in Calaveras County, and also at Whisky Hill, in Placer County, wherever gold and silver have yet been found in paying quantities in the decomposed rock formation, there also, or close at hand, are found the oxidized ores of copper, carbonates and silicates; and conversely, I have nowhere seen oxidized ores of copper in this decomposed rock which were not, comparatively at least, rich in gold and silver. It is true that sufficient developments have not yet been made to enable us to state whether this is the general fact or not. It is possible that the association of these ores may be to a certain extent accidental; but it is not unlikely that it may be otherwise;—and at all events this is a point well worthy of attention and further investigation.

As this finishes my remarks upon the "calico rock" formation, I will close by simply mentioning a point relating to the lower country of Calaveras County, that I have not yet seen publicly noticed elsewhere. The low, rolling hills which form the eastern border of the San Joaquin plain between the Stanislaus and Calaveras Rivers, contain extensive beds of horizontally stratified material, which is probably sedimentary-volcanic in origin. The color of these beds is usually varying shades of gray. They contain no pebbles, so far as I have seen; they generally crumble easily, and resemble in appearance a friable sandstone. But their grain or grit, which is pretty fine, is also quite clean and sharp as well as hard, and rough-polishes rapidly the hardest steel when rubbed upon it.

These beds are of considerable thickness, and cover many square miles of country. Their stratification has evidently not been disturbed since they were deposited, though they have been largely eroded. The frequent flat tops of the hills, and the level benches, which these beds have produced along their sides, by irregularities of wear, impart a peculiar aspect to the scenery.

Professor Silliman read the following:

## On the Occurrence of Glauberite at Borax Lake, California.

BY B. SILLIMAN.

Glauberite, a species not before recognised as occurring in North America occurs at Borax Lake, where it has lately been obtained in blue clay, brought up from a depth of forty feet by an artesian boring. No other crystallized, species was detected in the masses of clay examined.

Glauberite is a sulphate of lime and soda, half an atom of each base in combination with an atom of sulphuric acid. It is usually associated with rock salt, as at Villa Rubia, in New Castile, and also at Ausee, in Bavaria, and in the salt mines of Vic, in France. In the Atacama desert in Peru, it is associated with a fibrous borate of lime called Hagesine. Mr. Stretch, the State Mineralogist of Nevada, in his catalogue of minerals found in that State, mentions borate of lime (Hagesine) as occurring in globular masses and in layers from two to five inches thick, alternating with layers of salt in a salt marsh in the Columbus mining District, Esmeralda County. It is quite possible that a careful scrutiny would detect glauberite also in this association so analagous to that of Atacama.

Reference was also made to the occurrence of the species laghassite detected by Prof. S. in 1864, at the little Salt Lake near Rag Town in Nevada, as illustrating in an interesting manner, the chemistry of these bodies of saline water The latter species is a hydrous carbonate of lime and sodium, while glauberite is a sulphate of the same bases. Both salts undoubtedly result from the reaction of the respective elements pre-existing in solution in the saline waters.

The crystals of glauberite from Borax Lake occur in very thin flattened tables, derived apparently from the great extension of the faces *O* of the Monactinic prism.

Mr Bloomer read the following:

## On the Scientific Name of the "Big Trees."

BY H. G. BLOOMER, CURATOR OF BOTANY.

Early in 1853, specimens of the "Big Trees" were presented to this Academy; Dr. Kellogg and other botanists, members of the Academy, at once pronounced them to belong to the genus *Taxodium*, to which the common "Redwood" of California was referred at that time. Endlicher's work upon the Coniferæ, in which the genus *Sequoia* (named after an Indian Chief) was instituted, had not at that time reached us. Our California Redwood, *Taxodium* *sempervirens* was included in the new genus of Endlicher. So then, the true scientific position of the Big Trees was first determined by members of the California Academy of Natural Sciences. At the time of the presentation of these specimens, an English collector of plants and seeds, Mr. William Lobb, saw them, and having experience enough to know that they belonged to a species new to the gardeners, immediately started for the grove and obtained cones, wood and foliage, which he carried with him to England in the fall of 1853. Dr. Lindley hastily described these as *Wellingtonia gigantea* in the *Gardener's Chronicle* for December 1853.

In the meantime Drs. Kellogg and Behr pursued their studies of the great tree, and at length being convinced that there was no generic difference between it and the *Taxodium sempervirens* (now *Sequoia sempervirens*) instituted the species *Taxodium giganteum*, described in the Proceedings of the Cal. Acad. Nat. Sciences, May 7th, 1855, Vol. I, page 53.

Previous to this, however, Seemann, in Bonplandia, 3, p. 27, January 15th, 1855, described it under the term of *Sequoia Wellingtonia.* Mr. Seemann gives his reasons at length in the Magazine of Natural History, 3d Series, Vol. 3, p. 164, for discarding the genus *Wellingtonia* of Lindley, and says: "Dr. Torrey was undoubtedly the first who determined the true systematic position of the tree." Now this is an error, for Dr. Torrey's publication is dated in August, 1855; whereas Drs. Kellogg and Behr's appeared May 7th, 1855.

The principal thing to be determined in this matter now is, as to the name and author, for these must accompany each other; shall it be:

*Sequoia gigantea* Endlicher, May, 1847;
*Wellingtonia gigantea* Lindley, December, 1853;
*Sequoia Wellingtonia* Seemann, January 15th, 1855;
*Taxodium giganteum* Kellogg and Behr, May 7th, 1855; or
*Sequoia gigantea* Torrey, August, 1855?

There are a number of other names made use of and referred to by Seemann, Murray and others; but as they come to us without the least scientific authority, they ought not to be considered.

Dr. Lindley's genus falls to the ground almost by common consent. I will refer here to a communication from Prof. Brewer, late of the geological survey of this State. Before he left San Francisco, he sent Dr. W. J. Hooker one of the large photographs of the "Grizzly Giant," one of the big trees in the Mariposa grove; he had written to Prof. Brewer, asking about "the Wellingtonia, Washingtonia, I care not what you call it." In Prof. Brewer's answer, he told him that he (the Prof.) did care what he called it, and also that it was not a new genus, but a *Sequoia.* Dr. Hooker, in his answer to this, says: "I heartily agree with you in all you say about the big tree; it has now produced good fruit in our gardens, and is as true a *Sequoia* as can be, and should have no other name." So here we have high authority for discarding Lindley's *Wellingtonia.* Yet this only settles the question as to the generic term; Dr. Hooker's opinion thus far has only given us *Sequoia.*

The next claimant in point of priority is Dr. Seemann, who rightly refers it to

*Sequoia*, and adds the specific term *Wellingtonia*, giving sufficient reasons for discarding Endlicher's specific term *gigantea*, as that was shown by Hooker to be founded upon *Abies* (Picea) *bracteata*.

In recent publications of American botanists, we find the term *Sequoia gigantea* of Torrey used to designate the species; to show that this is not the true nomenclature, I need but to say that Dr. Torrey never described it at all in any book or proceedings. The reference is to the American Journal of Science and Art, Vol. 18, p. 286, August, 1855, where it says: "Dr. Torrey made to the American Association for the Advancement of Science a communication in reference to the Big Tree of California;" also Vol. 17, p. 443, but no description. Now here is no sufficient ground for Dr. Torrey's *Sequoia gigantea*, for there is absolutely no description at all, but a mere reference; and this reference is published three months after Drs. Kellogg and Behr have described the tree as *Taxodium giganteum*.

I think now that Endlicher's, Lindley's, and Torrey's claims have been refuted; the controversy is narrowed down as between Seemann and Drs. Kellogg and Behr. By strict usage, and without the usual courtesy of scientific men, the nomenclature of the "Big Tree" should be *Sequoia Wellingtonia* of Seemann. But if courtesy is to be shown at all, it should be to those students who are entitled to it; that Drs. Kellogg and Behr are justly entitled to this honor, I cannot for one moment doubt. Specimens of this gigantic tree were in their possession many months before any other botanist had directed his attention to the subject; studying indeed under every disadvantage, for our botanical literature at that time was very meagre, not even Endlicher's work on the Coniferæ, in which was to be found the then newly instituted *Sequoia*, to which was referred our common *Taxodium sempervirens* of Lambert, being available. Had they access to this work they would have given us *Sequoia gigantea*; mark, that this was three months before Torrey's reference.

They therefore are in truth and reality, if not technically, the first scientific discoverers of the true position of the great tree. The terms they used were *Taxodium giganteum*, meaning by this that it was a congener with *Taxodium sempervirens*, which it was.

If Seemann's technical claims are set aside, then by courtesy *Sequoia gigantea* Kellogg and Behr, ought to be written as the true name of the "Big Tree."

For the advancement of science, we hope the final closing of this and other questions pertaining to the Coniferæ of this coast will be left to the able monographer of this order, Dr. George Engelmann, of St. Louis, who is now in Europe, having the notes and observations of recent botanists, and who will there have access to all the literature and material necessary to establish scientific accuracy and unity in this important family of plants.

# INDEX OF AUTHORS.—1863-1868.

Ayres, Dr. W. O.—Remarks on Notorhynchus, etc. 15
  On the Sacred Turtle of Japan 16
Behr, Dr. H.—On Californian Lepidoptera 84, 123, 163, 178, 279, 296
Blake, Dr. J—Infusoria from the moving sands near San Francisco 35
  On the Gradual Elevation of the Land in the vicinity of San Francisco. 45
  On Fœtus of Embiotocoid Fishes 314, 371
Blake, Prof. W. P.—Gold from American River 166
  Fossils from Mare Island 166
  Fossils from Oregon Bar 167
  Fossils from Mariposa 170
  Oil Regions of Tulare Valley 193
  Sphene in the Sierra Nevada 193
  Iron Ore in Northern Arizona 206
  Gum of Sequoia gigantea 234
  Ammonites in Mariposa County 235
  Miscellaneous Notices 289
  Mineralogical Notices 297
  Fossil Fish from Nevada 306
  Fossil Saurians of California 307, 361
  Fossil Elephants Teeth 325
  Submerged Forests of Oregon 339
  Brown Coal of Oregon 347
  Analysis of Mt. Diablo Coal 348
Bloomer, H. G.—On the scientific names of the Big Trees 399
Bolander, Prof. H. N.—Description of a new species of Melica 4
  Shrubs and Trees growing near San Francisco 78, 296
  Grasses of Arizona 205
  Remarks on Californian Trees 225, 377
  Botanical Collections of Prof. A. Wood, in 1866 329
Brewer, Prof. W. H.—Plants growing in Hot Springs of California 121
  Explorations in Sierra Nevada 170
  Fossils of the Auriferous Slates 198
Brush, Prof. G. J.—Analysis of Meteoric Iron from Arizona 30
Canfield, Dr. C. A.—Notes on Antilocapra Americana 238
Carleton, Gen. J. H.—On Meteoric Iron from Arizona 33

- Carpenter, Dr. P. P.—New Marine Shells of California.......... 155, 175, 207
- Clayton, J. E.—Fossils from Nevada.......... 171
- Cooper, Dr. J. G.—On New or Rare Mollusca inhabiting California.......... 56
  - On a New Genus of Terrestrial Mollusca inhabiting California.......... 62
  - On New Genera and Species of Californian Fishes.......... 70, 93, 108
  - A New Californian Helix, etc.......... 259
  - A New Species of Pedipes.......... 294
  - West Coast Helicoid Land Shells.......... 331
- Croft, C. J.—The Grasses of Arizona.......... 205
- Dall, W. H.—Memorial of T. Bridges.......... 236
  - Notes on Octopus punctatus.......... 243
  - Notes on Shells of Santa Cruz, etc.......... 258
  - New Subfamily of Mollusca.......... 264
  - On Shells of Monterey.......... 271
  - On Errors in Geography of California.......... 273
  - Letter from Alaska.......... 367
- Dana, Prof. J. D.—On Crystallization of Brushite.......... 174
- Gabb, W. M.—A New Species of Virgularia from the Coast of California.......... 120
  - Cretaceous Fossils from Sonora, Mexico.......... 153
  - Fossils from Mariposa.......... 172
  - Fossils from San Luis Obispo.......... 173
  - New Marine Shells from Coast of California.......... 182
  - Cretaceous Formation of California.......... 301
  - Geology of Peru.......... 359
- Garrett, Andrew.—Descriptions of New Species of Fishes.......... 63, 103
- Gibbons. Dr. H.—On Rains at San Francisco.......... 261
- Goodyear, W. A.—On Salt Spring Valley, Calaveras County.......... 387
- Gray, Prof. Asa.—Descriptions of new Californian Plants.......... 101
- Hoffman, C. F.—On Hetch-Hetchy Valley.......... 368
- Jackson, Dr. C. T.—The Big Trees of Calaveras County.......... 204
- Kellogg, A., M.D.—Description of two New Species of Plants from Nevada. 9
  - On two New Species of Collomia from Nevada Territory.......... 17
  - A New Genus and Species of Plant from Nev. Territory, (Pterostephanus) 20
  - Descriptions of two New Plants, (Conyza, Collinsia.).......... 36
  - A New Species of Hosackia.......... 38
  - A New Species of Mentzelia.......... 40
  - Description of three New Plants.......... 42
  - A New Species of Allium.......... 54
  - A New Species of Alsine.......... 61
  - Thaspium cordatum and Epilobium obcordatum.......... 314
- Moore, G. E.—On Brushite.......... 167
- Newcomb, Dr. W.—New Species of Helix inhabiting California.......... 115
  - A New Species of Pedicularia.......... 121
  - New Species of Land Shells.......... 179
- Pease, W. H.—On an Atoll near the coast of Mexico.......... 200
- Preiss, Maj. E.—On Euphorbia prostrata as a remedy for Snake-Bites.......... 195
- Raimondi, Don A.—On Geology of Peru.......... 359
- Remond, A.—Description of two New Species of Bivalve Shells from the Tertiaries of Contra Costa County.......... 13

- Description of two Species of Scutella 13
- Four New Species of fossil Echinodermata 52
- Geological Explorations in Mexico 244
- Richthofen, Baron F.—On Natural System of Volcanic Rocks 356
- Rowell, Rev. J.—Description of Gundlachia Californica 21
  - On Pisidium angelicum 353
- Scudder, S. H.—Letter concerning Californian Butterflies 47
- Sharkey, Dr. J. M.—On fibrous Plants of Nicaragua 401
- Silliman, Prof. B.—Gold and Silver of Whisky and Quail Hills 349
  - Localities of Diamonds in California 354
  - Localities of Tellurids in California 378
  - Glauberite at Borax Lake 399
- Stearns, R. E. C.—Shells of Baulines Bay 275
  - Shells of Santa Barbara and San Diego 283
  - Obituary of R. Kennicott 298
  - Vitality of a Snail 328
  - On Orthagoriscus analis 341
  - On Helix Ayresiana 341
  - Shells of Santa Barbara, etc 343
  - Shells of Purissima, and Lobitas 345
  - On Exhibition of Parhelia 353
  - Shells of Bodega Bay 382
  - Shells of Alaska 384
- Trask, Dr. J. B.—Earthquakes in California during 1863, 1864 127
  - Earthquakes in California from 1800 to 1864 131
  - Earthquakes in California during 1864 190
  - Earthquakes in California during 1865 239
- Whitney, Prof. J. D.—On the inaccuracy of the Eighth Census, so far as it relates to the Metallic and Mineral Statistics of the United States, 6
  - Remarks on Japanese Minerals and Fossils 15
  - On the Progress of the Geological Survey of California 23
  - Analysis of Meteoric Iron, (Brush) 30, 34
  - On Meteoric Iron from Arizona 48, 240
  - On Meteorites of Pacific Coast 240
  - On Rémond's Explorations in Northern Mexico 243
  - On Geology of Nevada 266
  - On Absence of Drift in California 271
  - Human Skull from Calaveras County 277
  - Tungstate of Lime and Copper 287
  - Silurian Series of Nevada 307
  - Tertiary Fossils of Nevada 309
  - Triassic Fossils of Chili 311
  - Liassic Fossils of Chili 311
  - Tertiary Fossils of Chili 311
  - Cretaceous Fossils of Chili 311
  - Infusorial Deposits 319
  - The Highest Mountain of North America 325
  - On Coal of Webber Cañon 341
  - On Salt from Muddy River 341

On Ores from Comstock Lode.................................... 342
On Geological Position of Coal.................................. 356
On Fossil Tooth from Douglas Flat.............................. 356
On Oreodon Jaw.............................................. 363
On Visit to Oregon, etc........................................ 363
On Ores from Nevada and Mexico................................ 372
On Minerals of Pacific Coast................................372, 374
On Depression of Death Valley............................ 129, 376
On Maps of California......................................... 386
WILLIAMSON, COL. R. S.—On the Height of Mount Hood................. 364
On Depression of Death Valley..............................129, 376
WILSON, JOHN.—Indian Relics from Chihuahua....................... 160
WOOD, PROF. A.—Ascent of Mount Hood.............................. 292
Botanical Collections.......................................... 329

# GENERAL INDEX.

PAGE.
Abies 232
Acanthochites 211
Acanthopleura 211
Achatinella 182
Acmæa 213, 300
Æolis 59
Allium 54
Alsine 61
Altitude of Sacramento 386
American Satyrides 165
Amiantis callosa 286
Ammonites 235, 289
Amphissa 286
Amphithalamus 218
Amycla 159, 223
Anachis 223
Analysis of Coal 348
" of Salt 348
" of Ores 342
Angel Island 348, 353
Antilocapra 238
Antimoniate of Lead 372
Aplodontia 224
Aplopappus 9
Aplysia 57
Apocynum 352
Apogon 105
Arbutus 232
Arenaria 101
Argynnis 84
Aristida 205
Ascent of Mt. Hood 292, 364
Aspidium 129

PAGE.
Astarte 209
Astragalus 103
Astringent Gum 234
Astrodapsis 52
Astrophyton 300
Ayresia 73

Barometers 327
Baulines Bay Shells 275, 291
Bdellostoma 295, 331
Belemnites 173
Big Trees 399
Binneya 62
Botanical Collections 329
Brown Coal 347
Brushite 167
Buccinum 385

Calandrinia 102
Calliostoma 156, 186, 214
Cancellaria 186
Carcharodon 174
Cardium 13, 154, 209
Carex 38
Castanea 231
Catalogue of Mosses 386
Census, Eighth 6
Ceratites 167
Chætodon 65
Cheilodactylus 103
Chemnitzia 154, 220
Chionobas 163
Chironectes 64, 107
Chioræra 60

PAGE.
Chlorostoma 286
Chromis 160
Chrysallida 219
Cinnabar 298
Circe 189
Clathurella 184
Clypeaster 53
Coal, Geology of 356
" of Arizona 122
" of Mexico 251
" of Mt. Diablo 348
" of Oregon 347
" of Utah 341
Cœcum 215
Cœnonympha 164
Collinsia 36
Collomia 17
Collonia 175
Comstock Lode 342
Conus 174, 286
Conyza 36
Cooperella 208
Copper Glance 297
Corbula 207
Crenilabrus 106
Crepidula 385
Cretaceous Formation 301
Crustacea 313
Cupressus 228
Curator's Reports 2, 99, 235, 237, 312
Cysticerci 386
Cythna 219

Danais 84
Danaite 297
Daphnella 185
Dekaya 70
Delphinula 175
Dendronotus 59
Depression of Death Valley 129, 376
Diala 218
Diamonds in California 354
Diatomaceæ 258, 320
Doris 58, 346
Dosinia 174
Drift Formation 271

Earthquakes in China 278
" in California 127, 131, 190
239

PAGE.
Echinarachnius 53
Echinoderms, fossil 52
Eighth Census 6
Elephant's Teeth 325
Elevation of Land 45
Emarginula 188
Embiotocoids 314, 371
Eocene formation 301
Epilobium 314
Esquimaux 202
Ethalia 215
Eulima 221
Euphorbia 195, 367
European Satyrides 165
Excursion in Field 348, 352
Exocœtus 93
Exogyra 154
Exploration of Alaska 367, 377
Explosions under ground 364

Family Limneidae 264
Fenella 217
Fibrous plants 401
Field Excursions 348, 352
Flabellina 60
Fœtus of Fishes 314
Fossils of Alaska 367
" cretaceous 301
" Elephant 166, 171, 290, 325, 367
" Horse 166, 171
" canine Tooth 356
" Delphinidæ 361
" in Gold Formations 289
" from Mexico 247, 249, 250, 252
" from Nevada 266
" skull 277, 291
" fish 306
" bones 307
" Saurians 307
" Silurian 307
" tertiary 307
Fungi as Food, etc 292

Gadinia 188
Galerus 215
Gastridium 67
Geological Survey 23, 170
Geology of Coal 356
" of Mexico 243

PAGE.
Geology of Peru ........ 359
Gibbonsia ........ 109
Gibbula ........ 158, 176, 214
Gillichthys ........ 109
Glaciers in Arizona ........ 162
Glauberite ........ 399
Globulus ........ 176
Gold of Whisky Hill ........ 349
" Quail Hill ........ 349
Grapta ........ 123
Gundlachia ........ 21

Hagesine ........ 399
Haliotis ........ 300, 361
Height of Mt. Hood ........ 294, 326, 363, 364
" Sacramento ........ 386
" Mountains ........ 326
Helices of Santa Cruz ........ 258, 260
Helicoid Land Shells ........ 331
Helix ........ 115, 179, 225, 258, 291, 328, 334, 384
Hepburn's Shells ........ 283
Hetch-hetchy Valley ........ 368
Hosackia ........ 38
Hybrid Ducks ........ 324
" Haliotis ........ 361

Indian Hemp ........ 352
Infusoria ........ 35, 319
Iron Ore in Arizona ........ 206
Isapis ........ 217
Ischnochiton ........ 211

Jeffreysia ........ 209
Julis ........ 63
Junonia ........ 126

Kelloggia ........ 202
Kerargyrite ........ 297

Lagomys ........ 69
Land Shells of California ........ 331
Leda ........ 210
Leersia ........ 67
Leiostraca ........ 221
Lepidopleurus ........ 211
Lepton ........ 210
Leptonyx ........ 175, 286
Leptochiton ........ 212

PAGE.
Leptothyra ........ 286
Libocedrus ........ 228
Lilium ........ 202
Lima ........ 173
Limenitis ........ 127
Limneadæ ........ 264
Linum ........ 42, 102
Lioconcha ........ 189
Liotia ........ 158
Litiopa ........ 219
Lycæna ........ 279

Macadamizing Rock ........ 327
Macoma ........ 208
Mangelia ........ 185, 383
Margarita ........ 158
Margaritana ........ 258
Mariposite ........ 380
Mastodon teeth ........ 291
Melica ........ 4
Melissa and Meridion ........ 258
Melitæa ........ 85
Mentzelia ........ 40
Mesalia ........ 216
Meteoric iron ........ 21, 30, 48
Meteoric shower ........ 300
Meteorites ........ 240
Mexican Cotton ........ 17, 19
Minerals of California ........ 372, 374
" Whisky Hill ........ 351
Mining, Ancient ........ 358, 362
Minolia ........ 157
Mirabilis ........ 10, 68
Mispickel ........ 8, 297
Monterey Shells ........ 271
Mopalia ........ 385
Morains in Arizona ........ 162
Mount Hood ........ 292, 326, 364
Mountain Barometers ........ 327
Muhlenbergia ........ 205
Murex ........ 185, 224
Myxodes ........ 108

Nacella ........ 213
Nassa ........ 223
Natica ........ 174
Native Copper ........ 297
Navarchus ........ 8, 58

PAGE.

Navea 300, 346
Neaplysia 57
Neithea 154
Nemeobius 178
Nereocystes 324
Newcomb's collection 343
Northern drift 271
Nostoc 120
Notorhynchus 15

Octopus 243
Oenothera 198
Officers elected 3, 100, 177, 235, 312
Oil regions 193
Opalia 222
Ophisurus 66, 98
Orcynus 75
Ores from Nevada 372
Orthagoriscus 341
Ostrea 13
Ovibos 367
Oxide of Antimony 372

Pachydesma 286
Pallium 174
Panicum 121, 206
Parhelia 353
Paspalum 67
Peat Beds 325
Pecten 174
Pedicularia 121
Pedipes 294
Pentachæta 197
Peru, Geology of 359
Petricola 310
Phaca 103
Phidania 60
Pholadidea 310
Pholadomya 173
Picea 377, 401
Pinus 204, 226, 296, 317, 353, 358, 370
Planorbis 119
Pleuraphis 205
Pleurotoma 183
Plectodon 207
Poa 206
Polyporus 292
Pomaulax 286

PAGE.

Pompholyx 264
Porites 4
Pristiphora 210
Proustite 297
Psephis 209
Pteroplatea 112
Pterostephanus 21
Ptychostylis 187
Pulmonifera 334
Puncturella 214
Purpura 4, 286
Pyrameis 125

Quail Hill Minerals 349
Quercus 229, 296, 299, 370

Rains of San Francisco 261
Red Crustaceans 318
Rissoa 217
Rissoina 217
Rowellia 188

Salt from Muddy River 341
Salt Spring Valley 387
Sarcodes 202
Saturnia 296
Satyrus 164
Saxidomus 174, 286
Scalaria 221
Schinus 273
Scintilla 208
Scorpæna 105
Scurria 241
Scutella 13
Semele 208
Sequoia 170, 204, 288, 363, 399
Sharks' Teeth 290
Shells of Alaska 384
    “ of Baulines Bay 275, 291
    “ of Bodega Bay 382
    “ of California 334, 361
    “ of Monterey 271
    “ of Purissima 345
    “ of S. Cruz I. 345
    “ of Sta. Barbara 283, 343
    “ of San Diego 283
    “ of land of West Coast 334
Sierra Nevada Peaks 170

PAGE.
Silene Dorrii 44
Silkworms 296
Silver leaf 330
Silybum 125
Skull from Calaveras 277
Snail's vitality 328
Solariella 156
Sphene in Granite 193
Sphyræna 203
Strategus 8
Streptanthus 101
Styliferina 219
Submerged Forests 339
Subterranean Explosions 364
Succinea 181
Surcula 286

Taxodium 399
Taxus 229
Tellimya 210
Tellurian Minerals 378
Teredo 11
Terrestrial Molluscs 334
Thaspium 314
Torreya 229
Trachydermon 212, 383
Tricuspis 206
Trifolium 102
Trigonia 154
Triopa 59

PAGE.
Trochiscus 258, 275
Trophon 224
Tsuga 232
Tungstate of Silver and Copper 287
Turbinolia 154, 158
Turbo 175
Turbonilla 186
Turritella 154, 174, 216
Twelve Mile House 352

Urolophus 95

Vitality of a Snail 328
Vitis 233
Vitrina 334, 384
Volcanoes, Active 368
Volutharpa 385
Vanessa 123
Viola 101
Virgularia 120

Washingtonia 399
Wellingtonia 399
West Coast Helicoids 331
Whisky Hill Minerals 351
Wood's Collections 329

Xylotrya 11
Yoldia 189

Zirphæa 299
Zua 384

This book should be returned to the Library on or before the last date stamped below.

A fine of five cents a day is incurred by retaining it beyond the specified time.

Please return promptly.